April 1963

approach

THE NAVAL AVIATION SAFETY REVIEW

15

Flight Deck Handling
You and MEE
The Irish Menace

V.8
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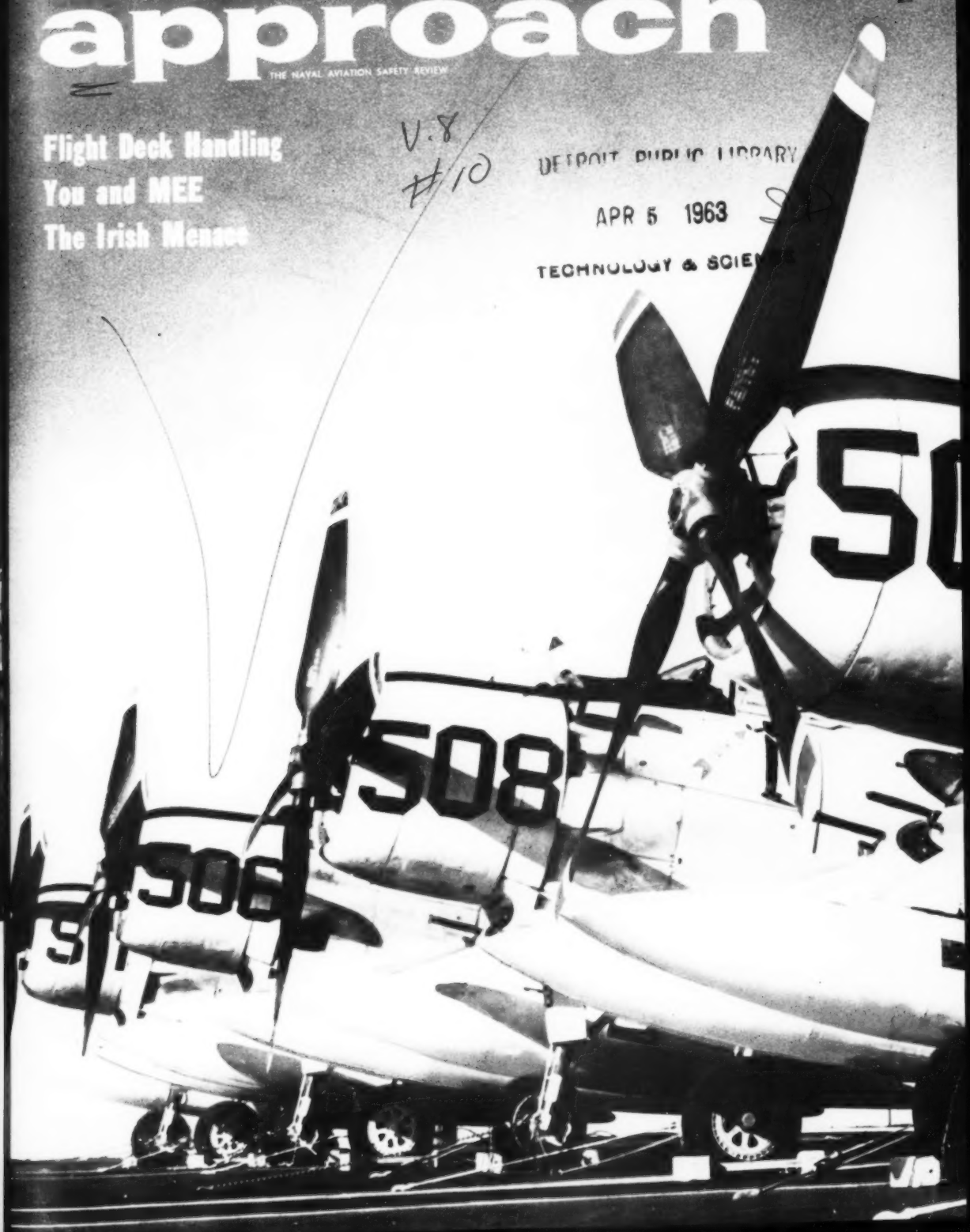
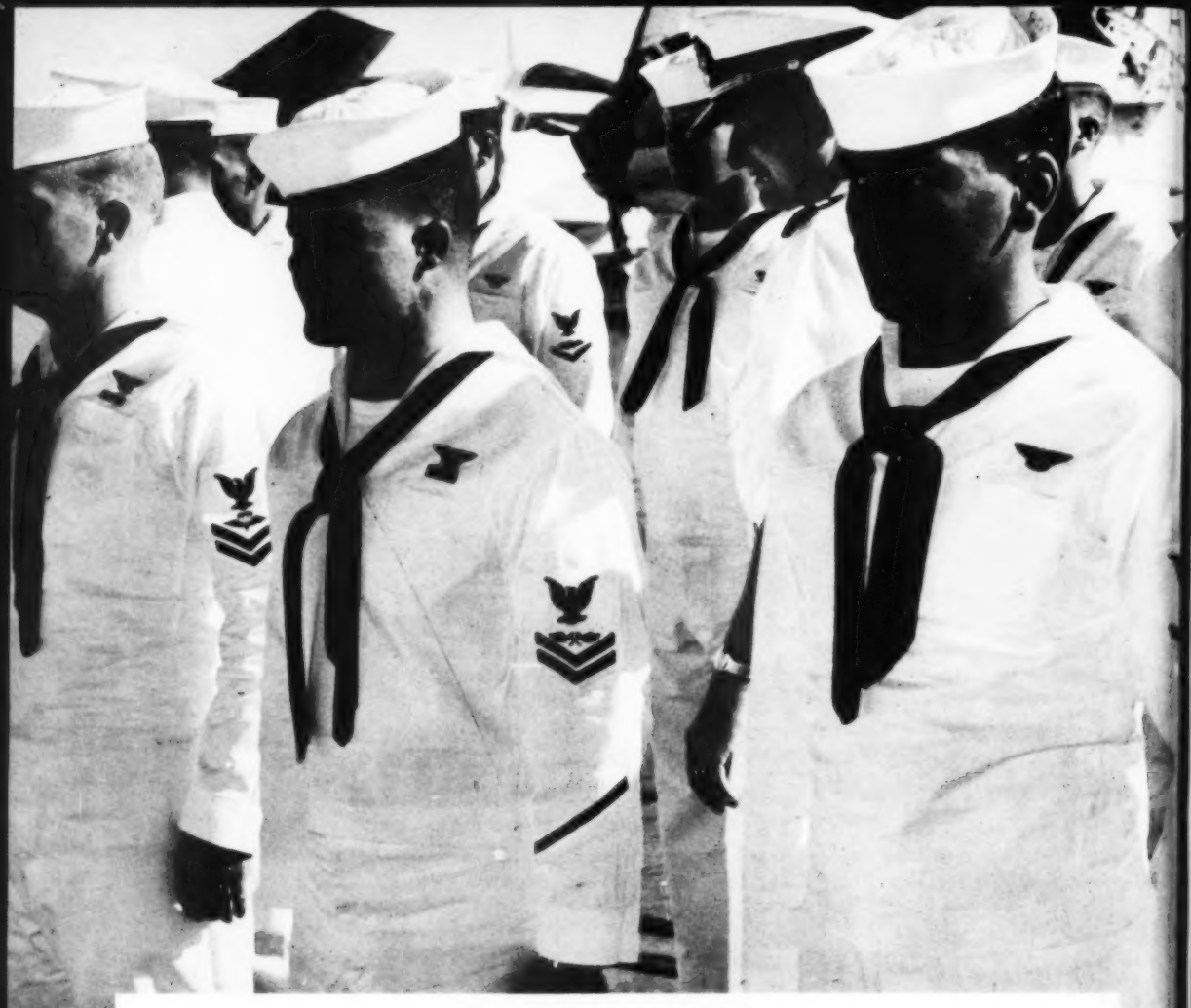
TECHNOLOGY & SCIENCE





The Key Is YOU

Xvxn though our typxwritxr is an old modxl, it works quitx wxll xxcxpt for onx of thx kxys. It is trux that thxrx arx forty kxys that function wxll xnough, but just onx kxy not working makxs thx diffxrxncx.

Somxtimxs it sxxms to mx that our maintxnancx program is somxwhat likx this typxwritxr — NOT ALL THX KXY PXOPLX ARX WORKING PROPXRLY.

You may say to yoursxlf, "Wxll, I am only onx pxrson, I won't makx or brxak a program." But it doxs makx a diffxrxncx bxcausx a maintxnancx program to bx xffxctivx rxquirxs thx participation of xvxry pxrson.

So thx nxxt timx you think you arx only onx pxrson and that your xfforts arx not nxxdxd, rxmxmbxr our typxwritxr and say to yoursxlf, "I am a KXY PXRSON in our MAINTXNANCX PROGRAM and I am NXXDXD VXRY MUCH."

YOU and MEE

Mr. Mechanic!—Here's a backward look to provide guidelines to the future—You're the *key* man in the efforts toward Maintenance Error Elimination—Profit by the mistakes of others—there's no need to make them yourself.

Everybody knows and realizes mistakes can be dangerous, are usually costly, are unnecessary and *can* be prevented. The point is, *how do we prevent them?*

Different organizations have come up with a variety of programs with some catchy names for their prevention efforts to stimulate thinking among their people. Some call it ZD for Zero Defects, some call it PEP for Personnel Error Prevention, or simply MEE —*for Maintenance Error Elimination*. The objectives of all these programs are pretty much alike; that is, to get everyone hep to their program, because it takes cooperation of all hands to get the job done. As the old saw goes—"One bad apple . . . "

Who makes maintenance errors? People. What group of people? Mechs. This message is therefore aimed at mechs. This group of people, more than any other, can eliminate these errors.

Before you get the idea that we're going to give you a simple formula to eliminate maintenance errors, we want to set the record straight. Only you, the mech, working out of the tool box, the line shack, the shop in the hangar or in the maintenance office as a top-of-the-line supervisor can do this. You, better than anyone else, know your capabilities, your fellow mechanic, your boss, your quality controller, your facilities and most of your problems.

So, what we are passing on to you are some facts you might not know. The areas where most maintenance errors are made, the model airplane involved,

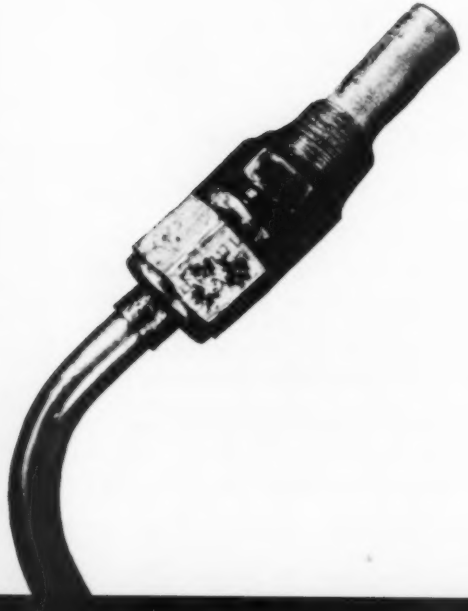
and a few examples so you'll know where and what to look for and what to do.

The best place to start is to review past accomplishments and mistakes. "Mech '62" was just published, and should be available to you. It has detailed information on every one of the 351 maintenance-error-caused mishaps that took place during fiscal '62. Its use as a tool in MEE is highly recommended. If you have difficulty in getting a copy drop APPROACH* a note—a copy will be in your hands in jig time.

* U. S. Naval Aviation Safety Center, Norfolk 11, Va.

Preflight Aid—Dzus line-up marks tell cowling is secured.

Undertorque— Above, F-9 keel nut became disconnected.



Now let's take a good look at the record:

Maintenance errors were involved in 1 out of every 12 reported mishaps during fiscal '62 compared to 1 in 10 reported during fiscal '61—a considerable accomplishment but still there's plenty of room for improvement.

Here are the areas in which the most can be done:

Preflighting—there were 33 instances in which doors, hatches, panels, windows and cowling were lost in flight. The solution to this problem should be obvious—thorough preflight.

Foreign Objects—Tools and hardware adrift caused damage or interference to flight controls in 15 cases. Complete inventory of tools and hardware after every job is most important. For practical methods of doing this please see Marine Captain Bob Gallant's article "Missing Tools," on page 42.

Torquing—27 cases where bolts, nuts and fittings were either over or under-torqued. Use of the HMI, verification of torque values and use of the right tools is a must.

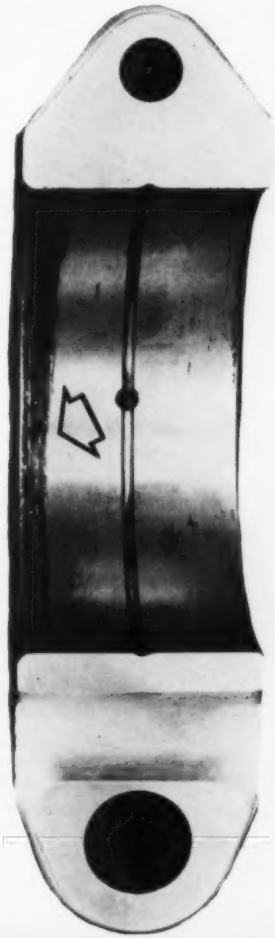
Cross-threaded—primer line (below left) led to P-2 fire.

"Space Engineering"—Not as difficult as it may appear. Before operating wing-folds, speed brakes, opening hatches, or bomb-bay doors, make sure you have enough clearance. There were 20 mishaps involving these components being crushed against other objects. Look before you move the control lever.

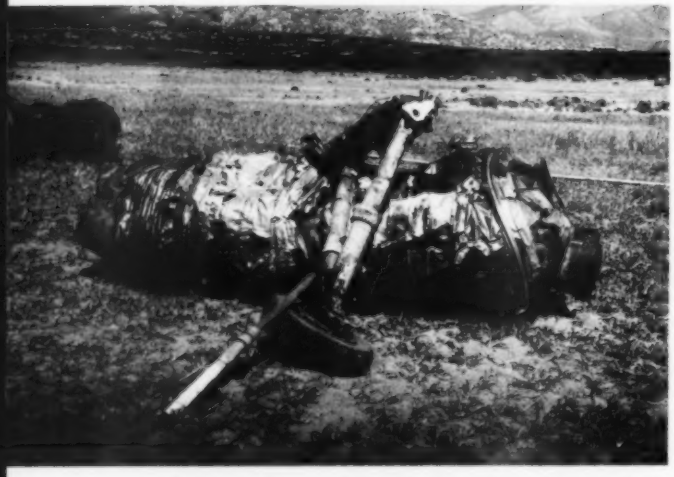
Locking and Safety Pins—22 times this important piece of hardware was either omitted or improperly installed. Double checks appear to be in order to prevent this type of goof.

Locking Pin—Improper installation caused gear to collapse on this *Willie Victor*.

Landing Gear Maintenance—17 gear failures, all because of improper maintenance. Factors range from inadequate troubleshooting, failure to dropcheck, lubricate, update and indicate. *Corrosion control, too, was lacking.* Hard landings make these components particularly vulnerable if thorough maintenance and inspection is less than best.



Landing Gear Lube—Lack of same caused bearing to seize and the *Ford* to land wheels-up.

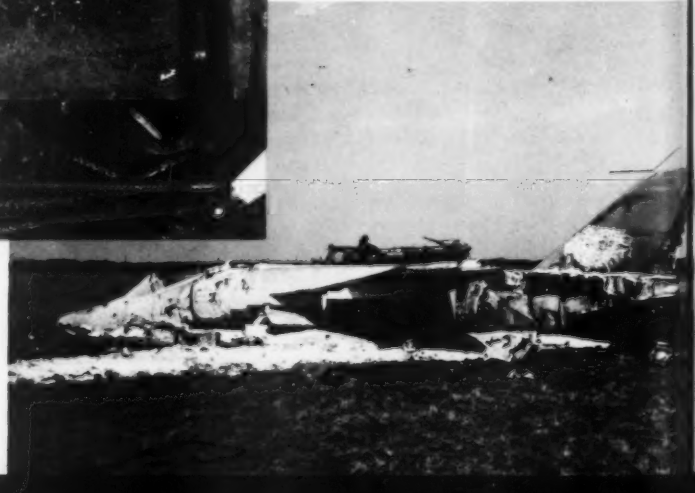


Cotter Pin Missing—Throttle linkage above, became disconnected caused loss of this F-8.

Cotter Pin Omissions—This category also involves lockwires, locking tabs (washers). These vital devices were omitted 15 times. Omission of these in flight and power plant controls invariably results in major mishaps. Every effort possible should be made to make sure these are in place before flight. The trouble here seems to be the feeling that even an apprentice can install these without difficulty. Consequently this detail is overlooked by the inspector when a skilled mechanic has to do the job. The mech is usually concentrating on the "more important" aspects such as getting the throttle control adjusted just right, getting the correct throw into flight controls—the plane gets buttoned up, usually at the last moment, without being inspected, and off she goes. The importance of the cotter pin develops when the plane fails to return.

In this phase of maintenance the best of reputations can and do go to pot in a hurry. Good horse sense tells you verification of installation of this simple hardware is *necessary and should be done by someone other than the man who was supposed to have done the job.*

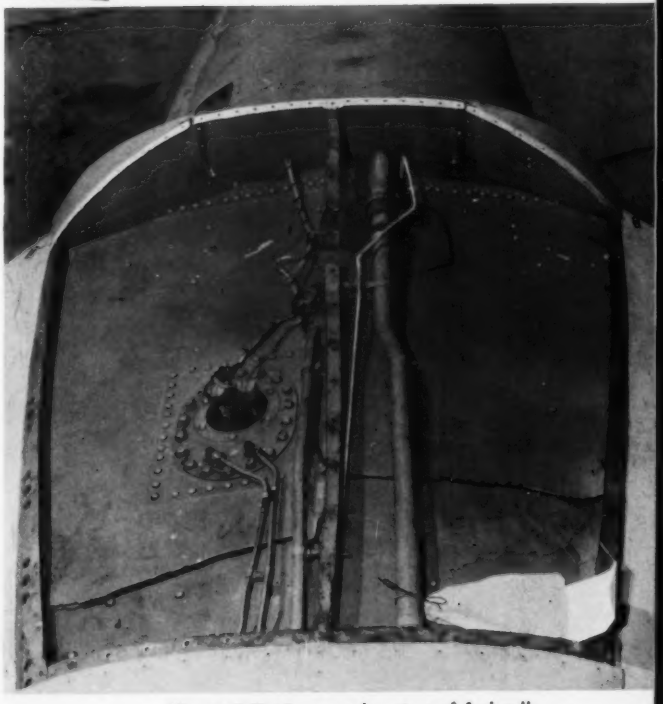
Lockwasher Missing—Left, screw (right) backed out of fuel pump circuit (arrow) caused loss of F-11, below.



Improper use of Jacks—Twelve airplanes were damaged substantially as a result of this goof. Bigger and heavier airplanes call for the best of equipment and judgment when undertaking a jacking operation. There's no room for jury rigs and amateurs here.

Jacking Operation—gone awry.

Servicing Aircraft—The most common mistake in 9 mishaps was overpressurization of fuel cells due to plugged vents following fuel cell tests. This oversight ends up in substantial damage every time. Check lists should note each vent and its inspection in the proper sequence of maintenance.



Plugged Vent—caused rupture of fuel cell.

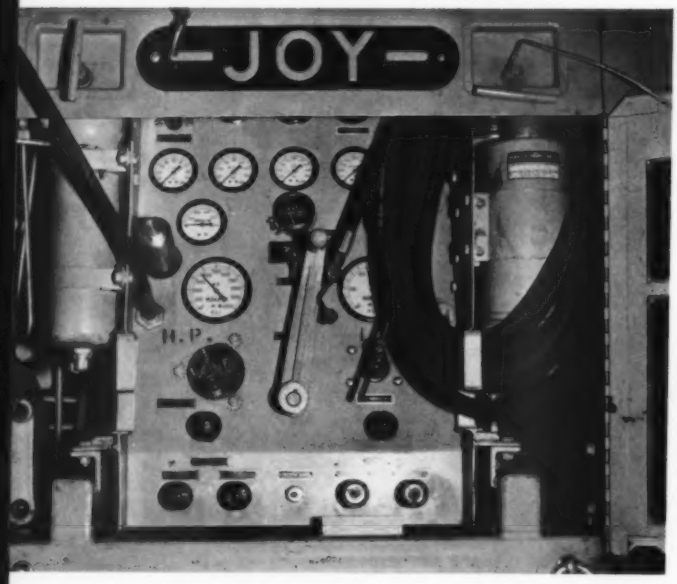
See, Hear . . .

Mr. Mechanic! Audio-visual presentations prepared by NASC are now available to you which record the epics of maintenance errors committed during 1962.

***If you're a recip mech** you'll be interested in viewing the 20-minute tape-slide presentation which tells the scope of the recip maintenance error problem and what you can do to help control it.*

***If you're a jet mech**—there are two such presentations which should vitally interest you —Jet Aircraft Maintenance Errors and FOD Prevention.*

See your Maintenance Officer or Safety Officer now—Profit by the mistakes of others —There's no need to make them all yourself.



High Pressure Air—Use of high side of the compressor above, caused tire explosion below, amputating an arm and leg of the operator.

Misuse of High Pressure Gases—BLEWEE! Eight times this happened, and more often than not, both man and machine got the blast. For your personal safety and to reduce the possibility of airframe damage, know your equipment before operating it. Use the correct gas at the correct pressure—make sure your gages are calibrated—. By all means refer to all applicable servicing instructions—Good luck!

Murphy's Law—Last but not least eight mishaps took place because a part which could be installed incorrectly *was!* Fortunately a greater number of errors due to this cause was discovered before something drastic happened. FUR System reports, Anymouse reports and letters, many of which have appeared on these pages, indicate mechs are reporting these design deficiencies upon discovery. Keep it up.

Feedback of this kind puts the designer and manufacturer on notice. As a consequence we expect fewer maintenance booby traps in new hardware. In the meantime the best bet yet to avoid being a victim of Murphy's Law is to follow maintenance instructions, test the system—*give it a functional check*—and have the inspector check and okay the installation. If you discover a Murphy situation by all means make out a FUR, also continue to cut APPROACH in. We'll pass the word so that others may benefit. As you probably know, Murphy possibilities exist throughout most components of an airframe. For an excellent treatise on the subject read C. Van Pelt's "The Irish Menace," beginning on page 36.

In summary, we've covered the major areas of maintenance in which errors are most common. We ask you to read "Mech 62" for important detailed info which may apply to your particular airplane and operation.

We take this opportunity to also point out that "Mech '63," now being compiled, indicates some improvement in the first quarter of '63—so far there are fewer mishaps, but at the same time, the same type errors are being made and dollar losses to us taxpayers, you and me, have increased by nearly 3 million dollars—nearly double the loss experienced during any quarter during the past 3 years. This is reason enough to put forth *your* best efforts towards *MEE.*

The BEST APPROACH

By CAPT A. W. (Smokey) Dean, Hq USAFE

There's a saying in bowling: "Pick up the spares, and the strikes will take care of themselves." In golf the pro's tell us, "To improve your game—start at the cup and work back to the tee," or "Drive for show—putt for dough."

In other words, it's not the big strike or the long drive off the tee that makes your game—it's the little things that count.

Could it be that this same logic applies to accident prevention?

We've been hammering on the aviators since 'way back when about this flying safety thing. We've covered everything about 40 times over—weather, approach, speeds, power curves, IPs, CRT, PIF, braking technique, pitch up, etc., etc., etc., etc. There's little left to say that hasn't already been said. But don't stop—keep on saying it.

Given a good aircraft (all systems fully operational), most of our pilots will accomplish the mission. Consequently —*most* of our pilots are safe pilots and will never intentionally contribute to the accident rate.

Now let's dream up a statement for aircraft accident prevention, like the philosophical first paragraph. How's this?: "Take care of the aircraft and the pilots will take care of it." No? Then try this one, "To reduce the rate, reduce the write-ups." Pretty good? Here's another, "To improve the rate—start at maintenance and work back to Ops." Could go on—the field is fairly well open—might even say unexplored.

The point is pretty plain. Let's put maximum effort into eliminating all the bugs in the aircraft, really work at producing a fully operational bird, and give the pilots a fair shake. Let's eliminate the causes of these many in-flight emergencies.

We need a fresh approach to aviation safety. We've been thinking too hard and too long about the flying portion of our mission, and not hard and long enough about the support end. Stop and consider for a moment the ratio between maintenance types and pilots—the ratio between maintenance man-hours and flying hours.

You can see at a glance that the majority of our people and effort is in the maintenance field. Every hour we spend in the air is generated by many, many hours of extremely meticulous work on the ground. Now stop and consider the ratio between the flying safety effort put forth toward the pilots and the safety effort put forth toward the maintenance men. It isn't hard to see that we are working on the small end of the problem. A classic example of the "tail wagging the dog!"

The demands on the maintenance man have become more and more critical with constant improvement and development of aircraft. Maintenance was fairly easy back in the old days; the reciprocating engine wasn't too hard to fathom, and it was usually forgiving when we did slip. Maintenance factor didn't crop up too often in an accident report. Material failure—yes, but not brought about by maintenance error nearly as often as by design deficiency and pilot technique. Back then, our flight safety program was being developed, and it was aimed predominantly at the pilot. I'm afraid this concept is still with us, but more out of habit than requirement. If we continue in this vein we are accepting a program that offered many advantages for the between-wars aircraft—but one that just doesn't cover the complex equipment on hand today.

We have changed our maintenance procedures several times to keep pace. We have changed our operational concepts tremendously to meet the ever-changing demands of modern warfare. But we are still following relatively the same narrow path in our flight safety program. We urge pilots to know well the emergency procedures, *but have we really made an effort to eliminate in-flight emergencies by preventing systems malfunctions which create the emergencies?*

Now, a few questions.

How many units have a really effective maintenance accident prevention program?

How many safety officers spend as much as one hour a week on maintenance safety problems? How many commanders think of maintenance when they think of flying safety? I'm not trying to bug you; you don't have to answer these questions to anyone but yourself, but I think that you will agree that we need a fresh approach to aviation safety—a better term is aircraft accident prevention. This approach has got to start at the TOP. Without the top, the tail will continue to wag the dog.

The top must recognize the problem, start the program, furnish the initiative. Maintenance will join; that's for sure.—*Adapted from "Aerospace Accident and Mainteance Review."*

NOTAMS

by LT. W. B. Neuberg

A NOTAM (Notice to Airmen) contains information about the establishment, condition or change in any aeronautical facility, service, procedure, or hazard, the rapid distribution of which is essential for the safe and efficient operation of aircraft. Under previous systems this information was received at a Naval Air Station operations office by random telephone, teletype, naval message or even speedletter. It was usually filed in a Kardex file which had a slot for each major airfield in every state. It was a long and tedious job for operations' personnel to post the NOTAMs. Even worse, at many stations there was no effective system for removing canceled NOTAMs. As a consequence, pilots often lost confidence in the information presented in this manner. Finally a good, accurate system has been developed as an extension of FLIP *(Flight Information Publications)*.

SOON a pilot will be able to check the NOTAM Display Board which, like the rest of the system, will be standard throughout the Navy and Air Force. Everything will be found in the same place no matter where you go. The job of displaying this information by operations' personnel is greatly reduced. The summary sheets are merely torn off the teletype at the place where "End of Section—" is printed and attached to the Notam Display Board with spring loaded clips. Additions and deletions should be penciled in at least every hour. What used to take hours each day now takes minutes, and is accurate, complete, and written in plain language or standard abbreviations as found in the front of the Enroute Supplement.

The people at Central NOTAM Facility (CNF), Tinker Air Force Base, do the work. They send out Part I, Temporary Notam Summaries every 12 hours, at 0600Z and 1800Z, and Part II, FLIP change summaries, once a week during the Saturday morning mid-watch. These are broken down to:

Part IA **Temporary General Area Notams for general areas on and off airways.**

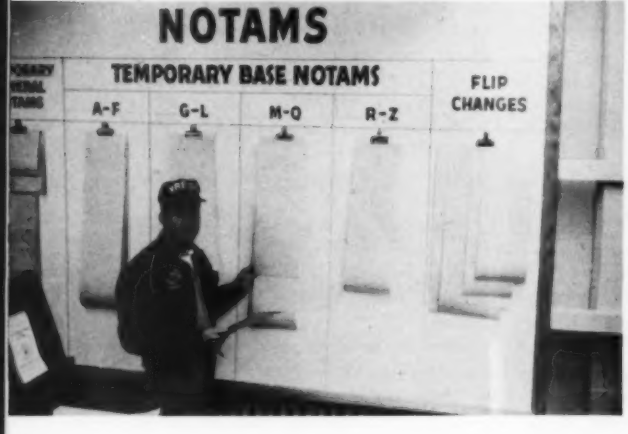
Part IB **Temporary Base Notams covering both civil and military operated Navaids and other Notam material affecting every Naval Air activity and Air Force Base, as well as civil fields with Air National Guard establishments.**

Part IIA **Aeronautical Chart and Information Center General Notams corrections to the latest addition of FLIP charts.**

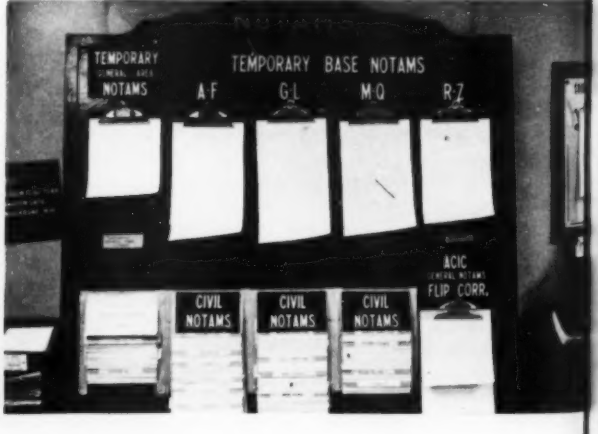
Part IIB **Aeronautical Chart and Information Center Base Notams corrections to FLIP publications for terminal facilities.**

When Central NOTAM Facility receives a NOTAM, they immediately screen it to see that it is in standard language and complies with NOTAM criteria to eliminate non-essential information. Within a half hour it is on the circuit to the operations office at

USAF standard Notam display.



Notam board at NAS Quonset Point shows excellent display.



every Naval Air activity and Air Force Base. The next step is to correct the IBM Card in the CNF file of Temporary NOTAMs, so the next 12 hour summary will be correct. If a notice is to be in effect for over 30 days it will be run as a Temporary Notam until the following Saturday morning when it is incorporated into the ACIC NOTAMS (FLIP Changes). The people at ACIC then make FLIP corrections and when the new publications become effective, it is no longer transmitted as an ACIC NOTAM.

FAA plans to handle NOTAMS in much the same manner and cover all enroute navigational aids. The ultimate goal of the NOTAM system is for FAA to handle everything. They have recently installed a new electronic computer and memory storage system at the FAA National Flight Data Center. When programming is complete, it will be possible to interrogate it for any aeronautical information conceivable. Then NOTAMS can be run off at lightning speed with infallible accuracy. In five years, it may be possible to submit every flight plan to the computer and before you can say "John Paul Jones," complete weather, NOTAMS, and all other essential information will be provided.

Meanwhile a pilot must check each section of the Notam Board plus Enroute Supplement Remarks and Special Notices, as well as FAA Enroute Notams. At Air Force Bases he should ask Base Operations personnel to check with FAA. At Navy activities he should ask for Enroute Notams during his weather briefing. He should remember that there are certain times and weather conditions when a facility may be shut down for routine maintenance without sending a NOTAM. These are found in the back of the Enroute Supplement. He should also check Special Notices in FLIP Planning Section I. All stations protected under the USN/USAF NOTAM SYSTEM will be marked in the Enroute Supplement. If you know a station is protected and there is nothing marked on either summary, you are safe.

When you have checked NOTAMS for your destination, alternates, and all enroute facilities, you can mark your DD-175 Notam Check "Yes." When filing from a civil field without Military Notams, place a collect call to the nearest USAF Weather Briefing Facility as listed in the back of the Enroute Supplement. When filing to a civilian field, be sure to check the Airman's Guide and FAA NOTAMS.

YOU HAVE NOT CHECKED NOTAMS UNLESS YOU HAVE SEEN:

1. **BASE NOTAMS**
2. **FLIP CHANGES**
3. **ENROUTE SUPPLEMENT REMARKS AND SPECIAL NOTICES**
4. **FLIP PLANNING—SECTION I SPECIAL NOTICES FOR DESTINATION AND ALTERNATES**

PLUS ENROUTE

1. **GENERAL NOTAMS**
2. **FAA NOTAMS**

The most discouraging aspect of this new system is that many Navy fields continue to cut up and file their NOTAMS in an obscure file. The Air Force has issued an instruction which standardizes and directs the prominent display of NOTAMS.

The U. S. Naval Oceanographic Office encourages naval air activities to improvise a similar conspicuous method of display. The improvised display will be an interim measure until OPNAV Instruction 5604.2A is revised to include a standard method of posting NOTAMS. ●

Lieutenant Neuberg entered the Navy in July 1954 as a Naval Aviation Cadet after graduation from Rensselaer Polytechnic Institute with a Bachelor of Science degree. Upon completion of flight training he returned to NAAS Whiting Field as a flight instructor in SNJ, T-28 and T-34 aircraft. In November 1957 he returned to civilian life as a chemist. While on inactive duty he was a member of numerous reserve squadrons located at Dallas, Willow Grove and Jacksonville. Lieutenant Neuberg voluntarily returned to active duty in October 1961 and was ordered to VRF-31 located at NAS Norfolk. He returned to inactive duty recently and makes his home in Darien, Connecticut.

LANCE STERLING

by

LCDR J. J. Schneider

NAS, N. Y.

I was telling a few of the girls at the Oceana Officer's Club about the merits of the *Waco* UPF7, when who walks in but Lance Sterling. Hadn't seen Lance since I nursed him through "advanced" at Corpus. He blushed as I introduced him around and then surprised me with "I've come in for instrument training, sir; any chance you might be my instructor?"

Kinda' took me off balance what with the drinking and the girls there and all, so I brushed aside memories of the "mid-air", the "ditching" and the "taxi job" and said for all to hear, "Lance boy, I'll personally see that you're assigned to me"—(Maybe he wasn't the greatest pilot in the world, but he was related to John Smerd the one-legged wing walker).

It was easy to see as we reminisced that Lance was somewhat apprehensive about flying jets in the clouds, so I decided to get him going right away to build up his confidence.

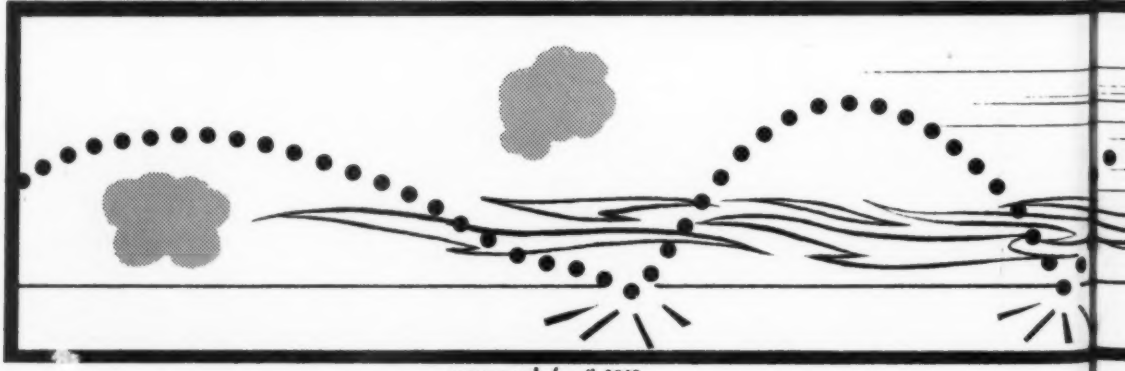
When the bar closed, I told Lance to be ready for an instrument check-out ride in the F9F-8T first thing next morning.

Lance was already suited up when I arrived at the readyroom and he looked pretty fit too. I raised some hell about the coffee mess—seems like I personally throw enough in the fund to warrant a decent cup of coffee but it was the same dark gut-binder as usual and boy! Just try smoking a cheap cigar first thing with no breakfast and then get hit with that coffee.

Well, I like to give a thorough briefing. I'm funny that way, but why not cover everything before hand so everybody knows what's what? Lance asked a few irrelevant questions about the plane systems and I straightened him out right away, that we were going on an instrument hop. After my third cup I went out to the plane and was pleased to see Lance had completed the walkaround for me and was all set to go.

Taxiing out, I told Lance, "forget what I said in the briefing, you might just as well start right in with a simulated instrument takeoff—get in the bag."

I think I kinda impressed him with this show of confidence, cause he never said a word—just fumbled around with the hood till he had it fastened. After checking a few of the essential items I told the tower I was ready and they cleared us to go.



G-at it again!

Now, let me tell you, the fun really began. I said to Lance "It's all yours" and he let go the brakes. The plane leaped forward and a little to the port and while Lance made no effort to correct for the heading I recalled he was always a late starter—no need to get excited.

We had a pretty wide runway there and I thought he should get it off before we reached the left side, but when we got up to T. O. speed plus 10 kts and were still edging toward the grass I did feel the adrenalin bubbling up a little. I didn't want to shake him by taking over, so I shouted into the mike "pull the damn thing up, you idiot!"

At T. O. speed plus 30 kts, with about 750 feet of runway left, I thought it was about time the old captain saved the day. I grabbed the stick and hauled back—but to my amazement we stayed glued to the ground—a quick glance showed me we had *full nose-down elevator trim.*

At T. O. speed plus 50 kts and 300 feet of runway left I threw on the flying tail and, remembering something about a tie-in between the two, I started the flaps up. We went between the GCA shack and the tower and rolled along the grass for about ¼ of a mile before I could get the monster into the air.

Now I know what you're goin' to say. The "old boy" should have used a checklist. But you're wrong as you ever could be. It was Lance's gloves that got us in the predicament—the gloves, plus his tightening up like a cheap sneaker in a shower. The way I figure it, he musta pretty near strangled the stick as we went rollin' down the concrete and the part of his glove between the thumb and index finger was working on the trim button all the while.

I wasn't too rough on Lance for the glove trick even though he argued for a long time he never touched the trim tab control,—he'll learn from his mistakes. But let me give some good advice right here and now to you new fellers. Should you ever fly with a seasoned veteran who doesn't need a checklist (and most of us can remember pretty near all that stuff) go over the darn thing yourself. Then if you do screw up with the gloves or the like, you'll not try and claim a foul.

I'm happy to say that nothing went into Lance's jacket as a result of all this. I personally settled with the farmer down the road that was hollering about the low flying jet frightening a bunch of his minks half to death. Let me tell you right now, those minks weren't scared nearly as much as the Old Captain.

For Seniors Only

To emphasize the critical importance of the commander's support in, and responsibility for, the success of aviation accident prevention, special training has been made available.

Since 1954 the University of Southern California has been conducting, under contract with the U. S. Navy, an eight-week Aviation Safety Officers' Course. The majority of the graduates of this course of instruction are assigned to squadron Safety Officer billets. For Commanding Officers and Staff Officers an orientation course in Aviation Safety and Accident Prevention has been established as an additional means of emphasizing the significance of aviation safety and its impact on the combat potential of the Navy's aviation striking forces. This short course is designed to acquaint these senior officers with the skills and knowledge which an aviation safety officer should possess, and with the contributions which can be made by this officer to aircraft accident prevention programs.

This course presents information concerning aviation physiology, aerodynamics and accident prevention as related to modern high performance aircraft.

Eight hours are devoted to aviation physiology and flight stresses important in aviation. Generally, these include effects of altitude and lowered barometric pressure; speed, motion and acceleration; stresses associated with characteristics of aircraft; habit stresses; fatigue; medical contributions to accident prevention and investigation; the importance of surgeon, pathologist and toxicological facilities and services in accident investigation.

Aviation psychology is also discussed in order to view the psychological factors in aircraft accident prevention and investigation. A six-point outline has been prepared for the course, dealing with identification of the human error in accidents; factors in control of attention; perception; decision making—importance of logical thinking; knowledge, motivation and experience; habit formation; and the effects of emotion on skill and thinking.

The week-long course also includes aeronautical engineering applied to aircraft accident prevention. This includes mathematics and physics of flight; aerodynamics; airplane performance, discussing the range and endurance of fixed-wing aircraft and helicopters; high speed aerodynamics and stability and control; and airplane structures, relating the structural requirements, recognition of failure types, flight operating strength requirements and the V-n diagram.

The development of a commander's aircraft accident prevention program is highlighted for eight hours. Techniques of accident prevention and mission accomplishment are discussed as well as how the safety officer can contribute to accident prevention.

As part of the accident prevention program the officers learn how to forestall accidents by organization of activities. A number of techniques are examined such as aircraft accident prevention surveys, operational hazard reporting, product improvement programs, aviation safety councils and educational activities.

The final seminar reviews the uses of aircraft accident investigation for prevention purposes. The officers study the organization and operation of boards, and committees for accident investigation; accident investigation reports—their importance, use and processing; cause factor analysis and determining the primary and contributing causes.

The next course is scheduled during the week of 15 July. Further information will be forthcoming in a Bureau of Naval Personnel Notice. ●

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Clipboard

What to do in Case of Emergency

Did you know that there is no longer such a thing as a deferred emergency? Well, there isn't any such animal. You either have an "emergency" or nothing at all.

We don't want to discourage you from declaring an emergency. Anytime there is something wrong with your aircraft or you—we want to be the *first* to know, so that we can get ready for any eventuality.

However, you cannot order an "a la carte" emergency by telling tower you would like "one crash truck, a sprinkling of foam and hold the ambulance and the helicopter."

Here is what to do if you have an emergency of a deferred nature:

(1) Call tower *immediately* when you know what your troubles are.

(2) Let them know what is wrong and when you plan to be back over the field for landing.

(3) Tell them you will declare an emergency at a time approximately 10 to 15 minutes prior to pancake.

(4) At the time designated tell them you are declaring an emergency (not a deferred emergency) and land at the time agreed upon. Of course, if the situation changes you can always declare your emergency earlier for an immediate landing.

The tower in the meantime will have notified members of the Crash Net by regular phone that you have troubles and will be in at a given time. When you actually declare the emergency (or 10 minutes prior to your landing), whichever is sooner) the tower will activate the Crash Alarm and you will be well taken care of.

Don't feel bad if you look back on rollout and see a fleet of red trucks, ambulances, and helicopters chasing you to a stop. That's their job. They are hoping, just as you, that your simple utility failure remains "simple." However, they want to be there just in case. —*3rd MAW*

Six on Time

"What do minutes mean. . . ?"

Robert F. Six, President of Continental Airlines, asked that question in a recent speech before an insurance group, and then proceeded to answer it: "Not counting depreciation and overhead, it costs $11.98 for each minute of jet flight; $5.72 for each minute of taxi time. This summer we will be operating in the neighborhood of 72 jet departures each day. If poor planning or operation adds three minutes of flight time and one minute of taxi time to each of these trips, our annual operating expense will increase by more than $1,000,000.

"Conversely, if we plan our flights proficiently and fly them with exactness, the savings can substantially aid our profit picture."

P.S. Safety fits into that same pattern. —*FSF Bulletin*

Jet Exhaust Soot on Wet Runways

AN article written by an airline pilot titled "Additional Lubricant to Reduce Runway Braking Action" referred to the accumulation of turbine engine exhaust particles on wet runways. FAA was contacted to seek additional information on this problem and received the following:

"We, in the Federal Aviation Agency, have not considered specifically the exhaust soot effect on runway traction and are not aware of any other studies or data on the problem.

"National Aeronautics and Space Administration engineers were questioned on the subject and agree that the effect should be very similar to the highway situation where oil and soot collect on a road surface. Under this situation, when a rain first starts, the oil and soot are floated to the surface which makes a very slick roadway. If the rain lasts very long, these are washed off and the traction improves to the level created by the 'clean wet' condition. As your pilots are already aware, clean wet runways are pretty slick, particularly at high speed and with worn tires.

"Both NASA and FAA are concerned with the poor braking traction problem on wet runways and have underway or are planning projects in this field. At the first opportunity, we will attempt to obtain some quantitative data on soot-water effects on braking traction.

"We appreciate your calling this problem to our attention."—*ALPA "Tech Talk"*

Ed. Note: We would appreciate receiving comments from pilots who have experienced poor braking action which may have been caused by jet engine soot on wet runways.

Flight and Hangar Deck Handling

Suppose that this page you are reading was your change of duty orders.

Have you ever considered how you'd like running a flight deck? Well, here you are, ordered to report to a whopping new carrier. You will organize and shake down the flight and hangar decks, get the air group aboard and join the fleet.

Has BuPers made a mistake in deciding that you are the one for the job? They knew exactly what they were doing. Remember that "extra" deployment you wangled with your last squadron? Great! You racked up more than a hundred additional jet landings, Mr. Centurion, and soaked up lots of tail hook lore to add to that learned on previous cruises. You were ready. BuPers took a long thorough look at your experience, considered your personality and everything else about you and someone there mashed the button which resulted, among other things, in your rearranging the squadron patches to make room on your flight jacket for the patch with the big black boot. The job is yours.

You know already that the Special Services Officer cannot slip you his copy of "Handy Dandy Guide for Fresh Caught Flight Deck Officers"—it hasn't been written yet. You now break out and examine, in a completely new light, your mental list of why-don't-they ideas about "how I'd do it if I were the Flight Deck Honcho" and then soberly decide to look

Every move must be thoroughly preplanned to prevent crunches.

Utilizing proven operating principles and safety procedures starts you on the way toward capturing your ship's "E"—and you can be sure she never will get it unless you do.

up a couple of old shipmates, one a former flight deck officer, the other an inveterate observer of operational readiness inspections.

What you are looking for is not detailed tricks-of-the-trade, you can come back later to pick those up. What you want right now is the big picture—all the labor-management, organization, communications and salesmanship information you need to get the supporting framework of sound general principles and basic organization to support the policies and operating procedures which are to follow.

You decide that you will talk it over with the Air Boss too and see if he wouldn't prefer a *working* flight deck officer rather than one with a title on the door and wall to wall deck tread on the floor of his office in flight deck control. Then you'll agree that it is preferable to have aircraft handling planned and controlled by the officer who will actually do the handling than by a different planner.

There are more than three hundred men in the flight and hangar deck crews, including the repair parties, fueling and ordnance personnel and others necessary for the support of flight operations. Lots of talent here! The mob scene at the Air Department's first attempt at flight quarters makes you suddenly appreciative, as never before, of the significance of General Custer's remark about the Indians. There *are* a lot of them! If you are to get and maintain control you will need a lot of help. That is why you intend to be very selective in designating key petty officers and directors from among the very best available. These are the lads through whom you will run the deck. Select wisely, recognize their abilities and *really* back them up. You will be continuously amazed and delighted by the things they can accomplish with man-power.

Speaking of man-power, it is hard to realize just how much sheer man-power you have to work with on a flight deck. In an emergency, sometimes it can be used much more effectively, and quickly, than machinery. Have you ever seen a deck crew physically lift an airplane enough to get the pilot clear following a deck crash?

Your key petty officers and directors are flight deck VIPs. Treat them fairly but always firmly. You are the one who is in control at all times and they are the ones to whom you *carefully* delegate responsibilities. The yellow shirt and the deck petty officer's shirts carry considerable prestige. You won't have to take away a shirt very often—but when the occupant doesn't measure up to your standards don't hesitate to take the shirt, temporarily or permanently as appropriate. You must do your part to make certain that they receive directions through you or your representative only. There can be no uncertainty on deck at any time. You can do more to ensure a

If supervisors are adamant about safe procedures their attitude will permeate the whole organization.

safe deck than anyone else by simply seeing that there is a firm hand at the helm at all times, and seeing that everyone knows it.

Your flight and hangar decks are not schools for recalcitrants. Probably you won't have the problem of having other divisions sending their difficult personnel to the flight deck to push airplanes. However, you do know about it and can guard against it. Every man in your crews should know that he is doing one of the most important jobs on the ship—and be mighty proud of it. The gruelling work associated with flight deck work must never be allowed to assume connotations of punishment. Work them hard, treat them fairly, earn their respect and require that they measure up to the jobs and you will find yourself enjoying one of the most rewarding and satisfying jobs you'll ever have. An effective and safe deck is invariably a disciplined deck. A discipline in which followers want to participate is intended here rather than the stern severe compulsion normally interpreted into the meaning.

You will, of course, organize the decks so that there is an unbroken chain of military authority and responsibility leading from the officer in charge of deck operations to every last man. In addition to the discipline mentioned previously your most important tools are gestures and hand signals and the sound powered telephone network—communications.

Very few air departments communicate well. That is one of the principal reasons you seldom see a truly outstanding deck handling operation. Insure that enough of your plane directors have the radio equipped headsets or provide phone talkers with leads of sufficient length to obtain maximum communications coverage on the flight deck and hangar deck. Good communications then becomes a matter of proper training and circuit discipline. Every time an airplane moves an inch or anything else significant occurs in the hanger or on the flight deck, brevity coded information should flow smoothly to and from flight deck control.

One of the most effective safety devices available is free—standard signals.

Almost from the beginning you will split your available personnel "down the middle" and establish two groups either of which can operate while the other rests. You will need just as many men on deck during night or limited air operations as at any other time. Every fire station must be manned pronto when a "spectacular" occurs and spotting by "braille" in the dark requires much care and many men. By rotating your two teams you can support indefinitely sustained air operations. Have your off-duty personnel berthed in compartments near their emergency stations. When you need them you will need them in a hurry.

All the tact, cunning, judiciousness and skill you can muster will be required in your "anti-crunch" program to prevent handling accidents. When aircraft are damaged or personnel are injured in handling accidents someone has fallen down on the job. Guess who? If you are adamant about safe procedures your attitude will permeate the whole organization. A flight deck and a hangar deck are dangerous places—but if you can finish a year of almost continuously sustained flight operations under all weather, darkness and other threats to safety without a single death, you're good! By the way, we're still asking why flight deck personnel do not receive hazardous duty compensation.

A smooth operating and safe deck is invariably a disciplined deck.

While carrier decks are dangerous areas, they can be kept from becoming any more dangerous than they inherently are. One important part of your safety program will be a vigorously prosecuted indoctrination program for men being introduced to flight operations for the first time. This must include air group personnel. Unauthorized personnel below the rank of captain are not allowed on the deck during air operations. Persuasion, friendly or applied, and exerted by key officer or petty officer and director personnel ensures the absence of idlers and sightseers from shelters when they are needed by those who must remain exposed to danger in the conduct of their deck duties. As handling or flight deck officer you can ensure that there is one thing for which there is *not* room on either deck, carelessness.

One of the most effective safety devices available to you is free—standard signals. Directors tend to develop their own personal, colorful and dangerous interpretations of standard taxi signals if they are allowed to do so. You may wish to allow your catapult spotters, who will be your best available directors, to "interpret" the signals just a tad more liberally in the interest of refinement and precision, prestige and pure public relations—it is expected. Everyone else, including yourself, must use standard signals.

One device which can raise hávoc on the flight deck is the "bull horn." You should have an understanding with the Air Boss that you have instructed your key personnel normally to look up the flight deck chain of command for confirmation before taking action on anything except dire and immediate emergencies. Communications should be accomplished through phone talkers on the sound powered circuit whenever possible. This routine procedure can prevent many confusing and possibly dangerous situations.

When you first start training your crews take it slowly and safely. Don't allow them to be rushed by anyone. The tempo will speed up naturally, and safely, as confidence grows. If you take charge with a firm and protective hand and in accordance with proven operating principles and safety procedures you are on the way toward capturing your ship's first "E"—*and you can be certain that she will never get it unless she has the best deck.*

In summary: Stir your mixture of men, machinery and motion carefully. Make haste slowly, using proven principles and procedures. Insist on military discipline, communications discipline and disciplined taxi signals. Discourage outside interference. Care for your people. Prove to them that they are on a team which accepts nothing less than the best. Work hard, the job you save may be your own; and, count your blessings—you're working with some of the world's finest people at one of the best and most important jobs that exists.

Hey! Where are you going? Flight quarters won't be sounded for another 10 minutes. ●

NATC PaxRiver recently conducted experiments to determine stability and control problems associated with helicopter engine failure and high and low speed autorotative entry. The SH-34/UH-34 throttle chopping produced the following results and discussion. . . .

Chopper Talk

An actual power failure of an engine in the model SH-34/UH-34 helicopter would result in a simultaneous failure of the aux servo. Loss of aux servo introduces a down-load on the collective control of 8-12 lb., increased friction in the cyclic control and more force required to manipulate the rudder pedals. The collective control down-load is generally considered advantageous because it assists the pilot in the required immediate collective reduction. Maintenance of collective control positions held prior to power failure would result in excessive decay of rotor speed. If the pilot's reaction would be one of immediately lowering the collective with the down-load, a satisfactory autorotational entry would be more easily accomplished.

An engine failure at any airspeed is not accompanied by severe attitude change. Stick position for a given airspeed is essentially the same in autorotation as in level flight. After autorotation has been established by lowering the collective following an engine failure, airspeed remains practically unchanged from that airspeed prior to the engine failure.

Lowering of the collective control should be deliberate after an engine failure during powered flight. An excessively rapid depression of the collective control will result in a normal acceleration of zero G or slightly negative. The zero G condition does not result in a loss of control or adverse aircraft characteristics; however, it may be disconcerting to the pilots. Delays in lowering the collective control will result in excessive rotor speed decay which can best be arrested by rapid collective control depression. If an impending engine failure forecasts itself to the pilot in some manner of sporadic engine operation, collective depression need not be so rapid and a smooth entry can be accomplished.

High Speed. In the event of an engine failure during high speed flight with the accompanying high collective control position, an immediate pilot reacton is needed to satisfactorily enter autorotation. The high blade angle of attack results in a high drag and a consequent rapid rate of rotor deceleration. In addition, blade stall will be encountered at the reduced rotor RPM. If the collective control is not lowered before the rotor RPM decays to the condition of blade stall (a maximum of 1 sec), severe difficulties may result.

After blade stall has been encountered, control and rotor RPM deteriorate even more rapidly. In addition, a nose-up pitch and left roll characteristic of blade stall is encountered. The situation is aggravated by the application of forward and right cyclic control movement. If the collective control is not lowered immediately, a complete loss of control and rotor RPM will result.

In the event of an engine failure during high speed flight at altitude approximately 400 ft. or above, it is mandatory that the collective control be lowered immediately. Airspeed adjustments need not be attempted until after a high speed autorotation has been established. Then a moderate application of aft cyclic control should be used to slow the air-

Reaction time to lower collective is critical when power fails at high speed—even in this old bird.

speed to the desired (60 kts. IAS for minimum rate of descent) speed for autorotation. Mild aft cyclic control application can be initiated simultaneously with collective depression, and the altitude loss will be decreased, but the prime consideration should be the collective depression.

Hover. Engine failure during an OGE hover at high power settings presents the greatest problem because of the large left yaw associated with a loss of power during this condition. A collective delay of greater than one second cannot be tolerated. Rotor RPM decay is rapid and, after lowering the collective pitch, considerable altitude is lost before a stabilized autorotative descent at 60 kts. IAS can be established.

The proper technique required to enter autorotation from a hover requires simultaneous lowering of the collective control, with application of forward cyclic control and right rudder pedal. Approximately 1000 ft. are lost in obtaining stabilized autorotation at 60 kts. IAS.

It may take 1000 feet to pick up 60 knots if your engine fails in a hover.

Climb. Engine failure during climb does not present as great a problem as an engine failure during high speed or hovering flight. Because of the high power setting during climb, the requirement for an immediate collective depression (maximum of 1 sec) is still paramount. During a climb, however, the airspeed is in the same range of the airspeed for optimum autorotation (60 kts. IAS), thus eliminating the requirement for large changes in airspeed from powered flight to non powered flight.

Low Rotor Speed. The evaluation included simulated engine failure at 2300 RPM at various power settings and airspeeds that could be expected during a ferry mission. At 203 rotor RPM (2300 engine RPM), it is evident that virtually no delay (maximum of one second) can be tolerated before the rotor

If power fails in a climb you still have only a second to lower collective.

RPM decays below the minimum permissable (170 rotor RPM). However, because of the nature of the mission, it is generally considered that a pilot's preparedness for engine failure is reduced. At 2300 rpm immediate pilot reaction is required for a satisfactory autorotational entry.

Turbulence. The rotor speed decay following an engine failure is more rapid during turbulent air conditions. Rotor RPM deceleration is more rapid and control of the helicopter becomes more difficult. In turbulence, blade stall becomes more evident at lower speeds than would be encountered in smooth air following an engine failure. In the event of an engine failure, pilot reaction time becomes more critical in turbulent air conditions and a smooth entry into autorotation becomes more difficult. ●

The Green Hills

PICTURE a beautiful day for flying with layers of scattered clouds at home plate and some higher thick clouds a few miles away. After a normal pre-flight, (the tires didn't blow when kicked), I took off and commenced a climb, picking my way through the clouds. Right away I noticed that the altimeter wasn't climbing and although the heater was set at 40°, it was rather hot in the cockpit, hot enough to make the zippers on my flight suit hot to the touch. I turned off the heater and checked the pitot tube which was uncovered. Everything else appeared normal, so I continued climbing around the clouds until I was on top of all of them at an indicated 33,000 feet. (This height of cloud tops was verified by another hop later in the day).

I jinxed around the local area awhile, with the heater OFF until the canopy became frosted, then I turned the heat ON again to defrost the canopy.

The temptation of the large cloud layer proved to be too much, so I called the approach control of the friendly Air Force base that just happened to be underneath the layer for a Tacan penetration and GCA. They cleared me to letdown in the holding pattern to the initial approach altitude, then to commence a penetration. I commenced a letdown and penetration with the heater OFF and the pitot heat ON.

My letdown to the initial approach altitude was a little erratic, which I attributed to having to dial in a frequency in the soup. I left the initial approach fix at what appeared to be the correct altitude and continued on down. But now things didn't look right, as the vertical speed indicator showed about 2000 feet/min down, airspeed up to 400 knots, and very little apparent change in altitude.

An SIF change consumed some time that could have been used to correct this. I was approaching 14 miles where the altitude is required to be 5000 feet, but I had 12,000 feet.

A little time was spent checking the speed brakes in normal and manual positions and they seemed to be working.

Suddenly, the white cloud turned into a green hillside! A lesser man would have become part of the hill, but I pulled full back on the stick, then closed the brakes as I added throttle. The tops here were about 10,000 so I soon broke out and started counting my blessings. Approach control was very solicitous and attempted to help, but none was really needed as I was now in the clear.

Landing at my sea level base was performed at an indicated 180 knots and 600 feet.

I stepped out of my little wrap-around bomber, ready to roast everyone in sight, but I was going to go at it slowly, fortunately. I told the plane captain how lucky he was to have me back, and before I could get warmed up, he pointed to the nose of the plane. All of the heater vents as well as the static vents were taped up! Several people, the last being myself, failed to remove the tape after a washing. Our Reserve A-4s are painted gray with orange DayGlo nose and trim. Of course, the tape used was gray.

Moral 1: *Check all vents for tape, especially on suspiciously clean airplanes.*

Moral 2: *Buy green or purple tape for gray airplanes with black, red and orange trim.*

ANYMOUSE

Don't Give up the Ship

AS I was flying over the Arctic ice pack north of Pt. Barrow in a UH-13 helicopter, I heard a loud thump against the firewall behind me. I automatically bottomed the collective and eased off on the throttle as I gave a mayday to the ship.

My eyes were busily trying to establish a landing area on the ice pack below when I realized that I was still sailing along in near normal cruise. I saw my RPM dropping down so increased my throttle to bring it back up. Although the RPM varied I did have some control with the throttle. A quick check of the collective revealed no resistance and no resultant pitch change. I was still deeply desirous of getting down, so I eased off on the throttle to just above minimum flying RPM to slow the bird down and descend to land on an open water area, as I had floats on.

It took time getting down since the wind was high and I feared letting the RPM get too low. Finally we were on the water and as I noticed the cylinder head temperature on red line, my crewman was out on the float looking at the engine giving me a cut signal. I did just that but then began the fight of keeping the rotor from hitting the tail cone. The blades were flapping wildly in a strong wind and it seemed years before the blades stopped going around. Application of the rotor brake would have caused the aircraft to rotate on the water. Finally everything was silent except the splashing sound of wavelets against the floats. Fortunately the icebreaker was only about a half mile away.

After the helo was lifted by crane aboard the ship we discovered that the fan had separated from the engine and had broken the bellcrank connecting the collective with the rotor head.

My conclusion is, "Don't lose control of your head, but if you do, don't give up the ship." Also, I now know why they call those things *poopy* suits..

J. C. ROBINSON, LT
HU-1 REAM FIELD

You were indeed fortunate that the icebreaker was so close. Here's to more and better poopy *suits.*
HEADMOUSE

Command Decision

1. *Deck launch on CVS:* Immediately after leaving the deck I felt severe forward yoke pressure. I increased back pressure to hold the nose up but the yoke popped forward again, this time below the horizon. At this time I slammed the gear up, yelled for the copilot to "Grab the yoke" and started seriously thinking that a ditching was about to occur. I got the nose above the horizon again and after another forward "pop" all the pressure was relieved and I found myself with lots of nose up trim and the yoke in my lap. Airspeed was about 110 knots. Good ol' overpowered *Stoof.*

2. Shortly after getting the plane retrimmed the copilot came up over the ICS and said "I guess I should have said something but I thought you overrotated on the takeoff so I pushed the yoke forward, but every time I pushed forward you pulled back all the harder."

3. Prevention of this incident is obvious: Only one pilot may fly the plane at a time.

4. To top matters off, the LSO growled at me for a poor departure no clearing turn.

Salty

I LAUNCHED in an A-4C (A4D-2N) at about 1600 local time from the USS BOAT as a tanker aircraft for air refueling exercise. After about 40 minutes, while my tanker drogue was extended, the fire warning light came ON. There were no secondary indications of fire in the cockpit or externally as confirmed by my wingman. Reducing power and jiggling the fire warning light did not help the situation. After about four minutes just as I was punching the warning light again, it suddenly ceased. I assumed the light had been cocked and that I had no more problems. Later as I was about to land I had an unsafe gear indication but the landing was uneventful.

Maintenance found that the aircraft had been parked on the bow, had taken some salt water and this salt water was the cause of my unsafe gear indication. A complete check of the fire warning system and the components checks showed no discrepancies. It was believed to be a salt solution from the salt water which caused a short in the fire warning system. The salt solution is believed to have burned itself out.

Stay Seated

FOLLOWING my second strafing pass on the spar there was a loud explosion and much debris in the cockpit of my F-8 (F8U). My first thought was to get as much altitude as possible so I pulled the stick back and at the same time I realized what had happened. The canopy had come off.

At 450 knots I felt certain I would be ejected. I positioned myself for ejection but brought the power back and put the speed brakes out. Glancing up I saw the face curtain out of place, flapping in the windblast.

Since I had not yet been ejected I wanted to get the curtain behind my head and very carefully I reached up with my left hand toward it. Although I was aware of the slipstream my hand only got to about helmet level when the arm went out and back. As it did so I was lifted far enough out of the seat for the windblast to catch my helmet. The airspeed was between 350-380 and I couldn't get back into the cockpit until it dropped to about 250.

Once back in the cockpit my troubles began. My arm was dislocated at the shoulder, a finger was broken and in general the arm was somewhat beat up. After experimenting I found the arm only good enough to move the throttle about 4-6 percent. The engine had stabilized at 84 percent so lack of throttle movement didn't worry me unduly at that point.

I called the ship and told them I thought I had a broken arm and was heading for the beach. Due to the wind blast I could not read the ship very good and they read me about the same. By this time the airspeed was around 190-200 knots.

When I had proceeded about 20 miles on course the ship called and instructed me to return. However, I felt I didn't have enough throttle control for a safe carrier approach (or bolter) and requested that I be diverted. Shortly thereafter another F-8 joined on me and we headed for shore.

Thirty minutes after my canopy jettisoned I saw that long runway and with my right hand I lowered my gear and raised the wing. Several minutes later I was in the hands of the medicos.

After investigation it was found that the locking flange on the port side emergency canopy actuating door was broken. The vibration of a low altitude strafing run with all guns firing was enough to allow the door to come open in flight. The firing cable played out into the wind (handle remained stowed) and the force of the slipstream was enough to fire the canopy off.

In November 1961 a pilot was inadvertently ejected at 35,000 feet and 1.4 IMN when his canopy exploded and the face curtain was snatched out by the windstream, firing his seat. It appeared to me that I had a similar situation going and this caused me to rush somewhat in attempting to capture the face curtain and tuck it behind my helmet.

Flight Control Check

PRIOR to a catapult launch the pilot of an F-3 (F3H) discovered that he could move the control stick only two inches to the right. He downed the aircraft immediately and maintenance personnel began a complete check of the control system. The aircraft had flown and made an arrested landing six hours prior to discovery of the discrepancy.

No external evidence of binding was apparent. Control surface, trim actuators and motors were checked with no results. Finally the trouble was found—an instrument line elbow (AN 822-4D) was lodged between the right lateral stick stop and the stick. This area around the control stick base and the forward torque tube assembly is almost completely enclosed. Ready access to the space is available through a zippered fabric boot.

Apparently the elbow had dropped into the area surrounding the control stick base while the fabric boot was open for maintenance work or through the one small hole forward while the aircraft was in inverted flight.

Had the pilot neglected the usual pre-launch control check he would have had plenty of trouble trying to correct a left wing down attitude after the cat shot. ●

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HEADMOUSE

In the Dark

Dear Headmouse:

What guidelines can you offer concerning lighting of ground support equipment (NC-5's etc)? The pilots complain if the normal headlights are used, red lenses in the past have been confused with tail lights, painting the upper half of each light black still brings pilot complaints, in fact nothing seems satisfactory. Some people have gone so far as to decree use of a flashlight with the vehicle lights kept off:

The other night that cost an aileron. Can someone come up with one good scheme and say this is it so we can act accordingly? As it is now each squadron of the 20 home-ported here seems to have its own idea and so they scrape or paint headlights to their own satisfaction and the results are equally haphazard.

LCDR J. E. COOPER
ASO, NAS, LEMOORE, CALIF.

▶ Headmouse and his staff of know-it-alls are in the dark on this one too. The floor is open to all for an exchange of ideas and experiences.

Very resp'y,

Headmouse

Doughnut During No-Flaps/ Slats Approach

Dear Headmouse:

In reviewing a recent AAR concerning a F-3B (F3H-2), an endorsement stated that a "doughnut" angle of attack indication during a no flaps/slats approach is a good one. I am sure this is because the angle of attack is almost the same for the F-3 aircraft regardless of the aircraft configuration. A friend flying the F-8 (F8U) tells me this is true for this bird as well. My question is: did the information contained in the endorsement apply to other model aircraft or is it good for the F-3B only?

ANYMOUSE

▶ The answer to your question is a conditional Yes.

For a successful landing you must fly your aircraft so that certain critical parameters can be confined to certain limits at touchdown. Among these parameters are pitch attitude, airspeed, sink rate, flight path angle, stall margin and controllability. For the best angle of attack there is a corresponding point on the lift versus angle of attack curve. Since the basic section curve changes in the dirty configuration, (see figures 1-17 and 1-18 of Aerodynamics for Naval Aviators) a point on the curve with slots for example, may or may not be in the proper place on the clean configuration curve. If the point is in the proper place (below stall) you may be marginal but safe. However, if the point is in the wrong place (above the stall angle) you've bought the farm.

During the approach phase, you are limited to angles of attack that are aerodynamically safe, in other words, an angle that will provide acceptable stall margin and good controllability and at the same time will not result in the other parameters being so far out of limits that a last second correction will not bring them within limits necessary for touchdown.

The point is this, you may fly the approach with the same angle of attack provided the airspeed is not excessive for landing or the flying qualities and stall margin deteriorate below safe limits.

The F-8 (F8U) is a special case where the angle of attack vane measures AOA with respect to the fuselage reference line but the wing angle of attack is greater by the amount of wing incidence. In the case of a wing-down approach, airspeed must be compromised with pitch angle to keep from crunching the tailpipe.

Very resp'y,

Headmouse

Grounding Tiedowns

Dear Headmouse:

Two different activities, an NAS and a MCAS both discovered *inadvertently(!)* that all aircraft tiedowns are *not* grounds. Your friendly ASO was shook, to say the very least, to be handed a beneficial suggestion for evaluation which suggested grounding said tiedowns. Work commenced forthwith, and the suggestor got a 4.0. Tiedowns that are not grounds should be marked (red circle, or square) and personnel instructed *thoroughly*. We've been awfully lucky for many years.

ANYMOUSE

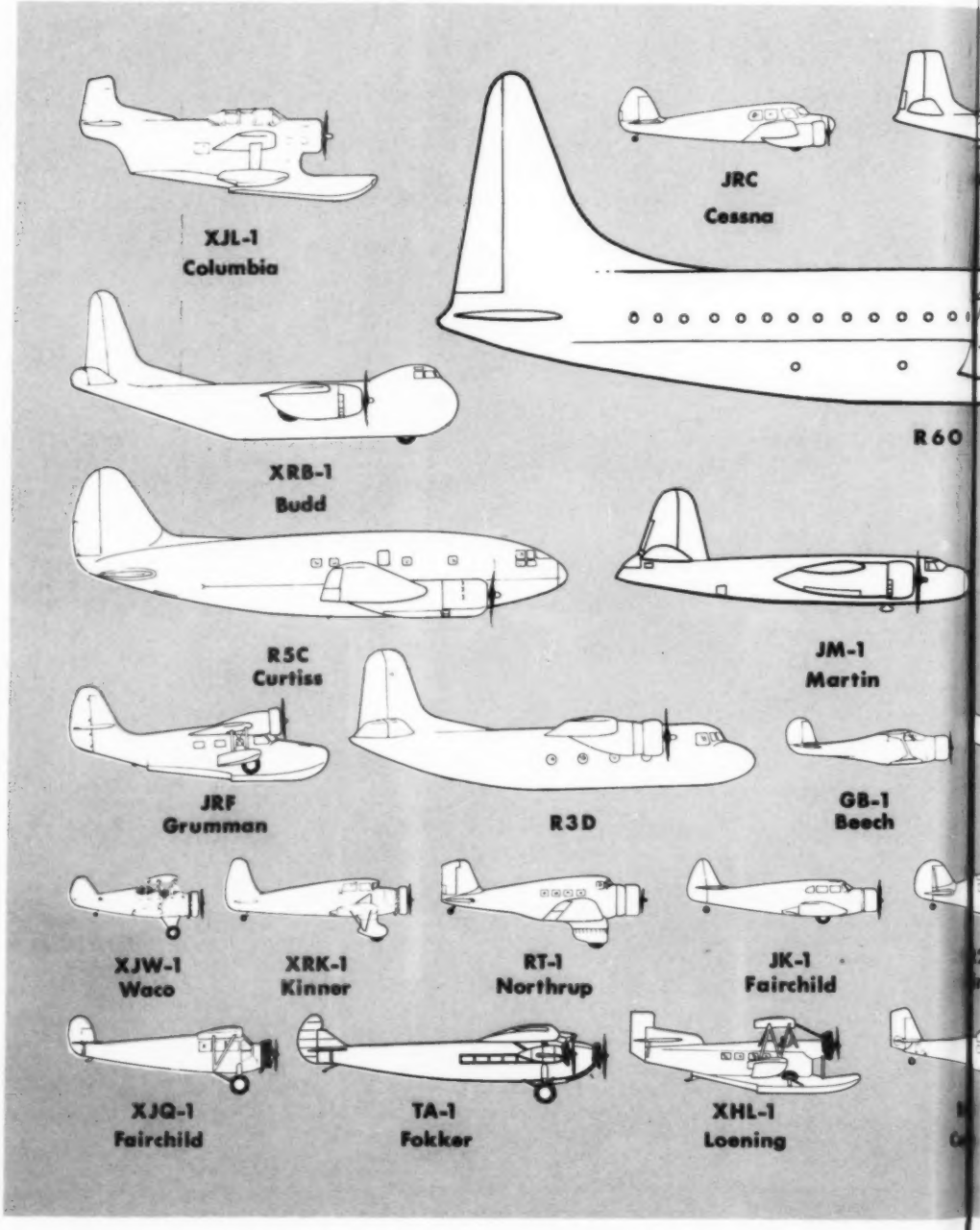
▶ Some outfits have discovered this fact the hard way. Static electricity set off an explosion in an A-3 during a fueling operation because the aircraft was improperly grounded. Of interest is the Air Force requirement that large aircraft such as the B-47 be grounded with four ground wires. There are no current instructions covering the grounding of aircraft through aircraft tie-downs. BuAer Inst 11012.1A establishes the requirement for 2 grounds per high speed refueling lane but does not specify that these grounds be incorporated in an aircraft tiedown. NavDocks Spec 46Yd of Sept '61 defines type A and B tiedowns but does not require they be grounded.

Very resp'y',

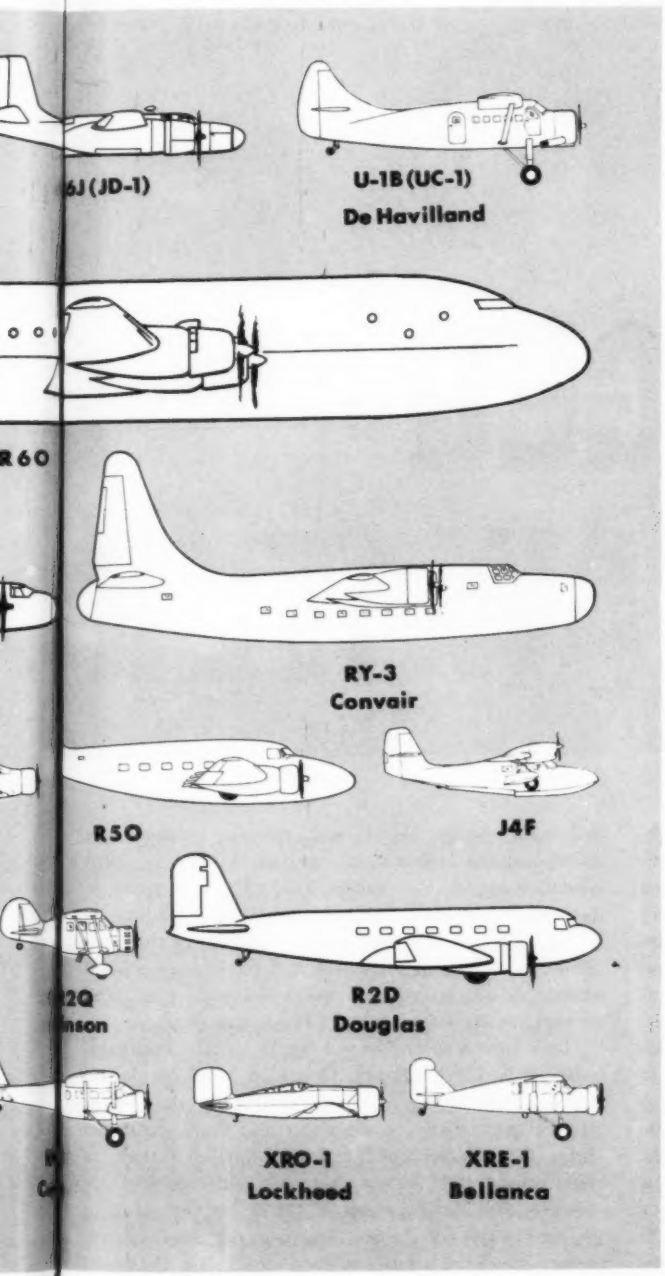
Headmouse

Have you a question? Send it to Headmouse, U.S. Naval Aviation Safety Center, Norfolk 11, Virginia. He'll do his best to help.

DEVELOPMENT OF TRANSPOR



ORAND UTILITY PLANES -PART II



In this, the last chapter on fixed wing aircraft, it is difficult not to look back and wonder over the changes which have come to aviation. Some of the changes have been described as revolutions but they were not. Airmen are among the most conservative people on earth and the reshaping of the body was really a cautious evolution.

And just as the human body drags along the remnants of an earlier age, the appendix and sinus for example, aviation does not easily let go of concepts which have proved useful. The aircraft at lower left and the one at upper right are remarkably similar to be separated by 30 years—a period which, on a miniature scale, might represent the span from the Roman Empire to the electric light as far as aeronautical achievement is concerned.

History should not be just a slavish devotion to the past. One of its tasks is to give the present some sort of orientation in time and space, to see how far up the ladder we are. No man knows for certain how many rungs are left to climb, but it is interesting to speculate. Are we not now near the top of the ladder? What technology can or will usurp the place of the fixed wing as we know it?

We cannot overlook examples provided by the sailing ships or steam locomotives. They melted rapidly away a short time after achieving the peak of efficiency even though the demand for carrying burdens over land and water was as great as before. The function of air transportation will remain. What will be the shape of the vessel and how will it be powered? ●

The water requirements of a man at sea vary between two and three pints daily; if there is no shade and it is very hot, they may be much higher. Recently the drinking of sea water has been advocated for castaways, who have no fresh water, but a group of experts convened by the World Health Organization (WHO) stresses the dangers of sea water and states categorically that it should never be drunk.

the DANGER of drinking SEAWATER

The salt content of the body fluids is about 1%. In the open ocean, on the other hand, the salt content of the sea is about 3½%. In health, when food and water consumption is adequate, the salt concentration in the body is kept relatively constant by the kidney; it varies, but only within a small range.

In the healthy individual suffering from deprivation of water, the concentration of salt in the urine does not average more than 2%. This difference in salt content between the body fluids and sea water and the physiological inability of the kidney to excrete more than a certain proportion of salt in the urine form the basis of the generally accepted view that drinking sea water does harm. It introduces a hypertonic solution into the circulation, water is withdrawn from the tissues to restore the osmotic balance between tissue and vascular system, the blood volume is increased, and the kidney is called upon to excrete the excess fluid. The net result is progressive dehydration of the tissues, leading to disturbances in the acid-balance, a rise in the non-protein nitrogen of the blood and the plasma protein concentration, a reduced cardiac output, thirst, and in due course exhaustion, collapse and death.

This view was challenged by Dr. Alain Bombard, who crossed the Atlantic Ocean in 1952 on an inflatable raft, taking over two months for the voyage and relying chiefly on sea water and fluids expressed from fish to quench his thirst. Bombard wrote a book about this voyage that met with considerable success, and his advocacy of sea water for drinking by castaways when fresh water is not available received much publicity—a good deal more than that

received by any attempt to refute his views. The opinion he reached after these trials on himself was that people should begin drinking sea water as soon as possible before dehydration starts, but in small quantities only, so as to avoid nausea and diarrhea. The fresh water that is available should be carefully conserved, and if there is none, fluids should be expressed from fish by squeezing them in plastic bags or towels.

Bombard's experiments were followed with great interest by Dr. G. Aury, principal medical officer of the French Navy, and in 1953 and 1954 he also carried out experiments on volunteers subjected to shipwreck conditions, he himself taking part. Aury described the experiments as being very successful; the sea water was readily drunk by the volunteers, they suffered from no serious complaints, and when the experiments were over they were able to resume their duties immediately. It may be noted, however, that the experiments lasted for only 2-4 days.

Impressed by Bombard's findings, a German physician, Dr. Lindemann, made no less than three voyages across the Atlantic ocean, in a canoe and then in a collapsible boat. Lindemann also wrote a book on his voyages, which for one reason or another failed to achieve the publicity that had attended Bombard's. Lindemann reached diametrically opposite conclusions to those of Bombard and Aury. Sea water, he held, should never be drunk; fluid could only be expressed from fish by means of a press; and no fish should be eaten if no fresh water is available.

In 1959, the question of drinking sea water came before the Maritime Safety Committee of the Inter-Governmental Maritime Consultative Organization

(IMCO). The experiments of Bombard and Aury and the wide publicity they had received had created much confusion about the drinking of sea water, and the impression had spread among seafarers that the dangers of drinking sea water had been grossly exaggerated. The Maritime Safety Committee felt that an authoritative opinion was required on what had become a controversial question, and asked WHO for its views. Pending a definitive opinion to the contrary, however, the Committee urged that no governments should advocate the drinking of sea water by shipwrecked mariners.

WHO convened a meeting of five internationally recognized experts at Geneva to discuss the question. These were: Surgeon Capt. F. W. Baskerville, United Kingdom; Dr. J. Bare, Switzerland; Dr. H. Laborit, France; Professor R. A. McCance, United Kingdom; and Professor A. V. Wolf, USA. Their views—which, it may be noted, do not represent the decisions or stated policy of WHO—were based on an analysis of all the available evidence.

The experts considered the effects of drinking sea water under three heads: effects on the bowel, on the body as a whole and on the mind. Because of the well-known cathartic effect of salts, drinking sea water is likely to lead to intestinal discomfort, if not to frank diarrhea. This effect varies in different individuals, and is more likely to follow if large amounts are ingested. On the body as a whole, the effect of sea water is to overload the circulation with salt, which can only be excreted by drawing upon the body water and so dehydrating the body even more. Finally, the evidence shows that even small amounts of sea water affect some individuals unfavorably, while large amounts have been shown to lead to mental disturbances and even suicidal impulses.

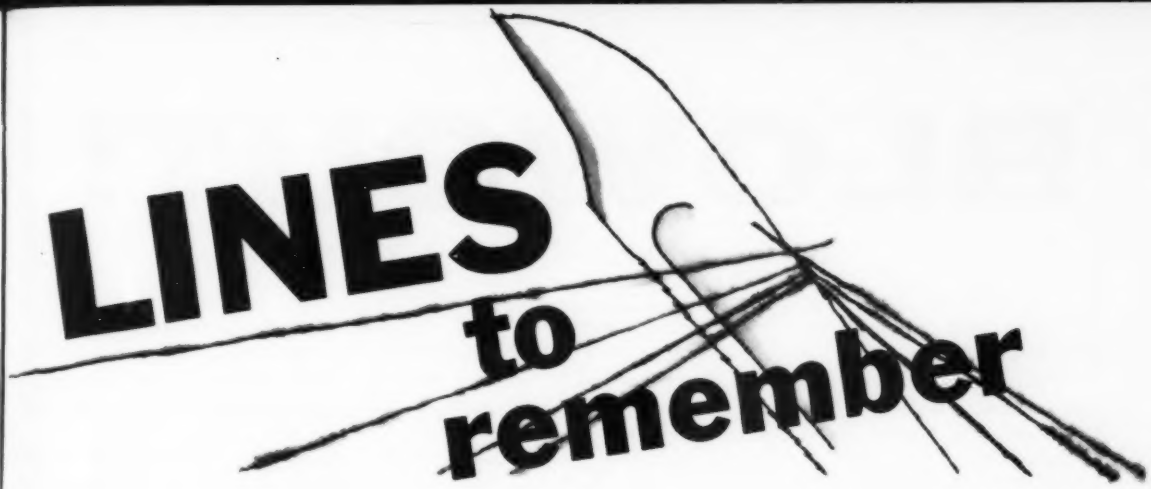
The experts examined the contention that a limited supply of fresh water could be made to last longer if it were mixed with sea water. This has been shown to be feasible experimentally in certain animals and is theoretically possible in man. But (the group emphasized) no acceptable evidence has ever been adduced that in man sea water can be used satisfactorily to eke out supplies of fresh water. This as yet unproved hypothesis cannot, therefore, be made the basis of a practical recommendation for saving the life of people shipwrecked at sea.

One of the reasons for advocating the drinking of sea water is to preserve morale, which in the circumstances of shipwreck is likely to be low. The experts held the view that morale can be upheld if it is made clear to the castaways that death from lack of water alone is hardly possible for several days. It has been shown from experimental work that a man can remain reasonably fit without water for six days, and men have survived without it for twice that period at sea. It has also been shown that 500 ml. (one pint) of fresh water daily, if possible supplemented by 100 g. ($3\frac{1}{2}$ ounces) of carbohydrate, will maintain a man almost without deterioration for at least six days.

"After any disaster," the group remarked, "many survivors are mentally stunned and incapable of thinking for themselves. It is therefore important that as many of the ship's company as possible be qualified to take charge, preferably those with a natural ability for leadership. Discipline must be maintained, proper lookouts kept and rations evenly and regularly issued. Everything must be done to obtain the best protection against cold or heat, to secure adequate ventilation in a covered raft and thus avoid carbon dioxide poisoning, and, finally, to conserve as much energy as possible. A simple routine will do much to convince the untrained survivor that the situation is in hand and that 'everything is going to be all right.'"

The group ended its report with the following advice to those who have to abandon ship:

- Unless you are in charge of a party, do as you are told. Try to remain cheerful. Discipline and morale count for more than anything else.
- If you have a remedy for sea-sickness, take it, if needed.
- If the atmospheric temperature is low, your immediate and most dangerous enemy will be cold, so put on as many woolen clothes as you can. They will help keep you warm in the water or on a covered raft, and even if you are fully clothed your lifejacket will always keep you afloat.
- If the temperature is high, avoid sunburn, keep yourself as much as possible in the shade, and keep your clothes moist to reduce sweating and so conserve body water.
- Drink no water for the first 24 hours you are adrift. Then take 500 ml. (a pint) of fresh water daily until supplies run low, thereafter 100 ml. until the water is finished.
- *Never drink sea water.* Never mix sea with fresh water if fresh water is in short supply. Sea water has been used to moisten the mouth, but the temptation to swallow it may be irresistible and it is better not to use it for this purpose. Never drink urine. —*USN Medical Newsletter, Vol. 40, No. 9*



FOLLOWING power loss and two unsuccessful attempts to light afterburner shortly after cat launch, the *Demon* pilot ejected. The seat fired through the canopy at 10 to 20 feet above sea level. The pilot hit the water before his main parachute could fully deploy. Sea state was rough.

"I submerged briefly and paddled to the surface amid a tangle of parachute shroudlines. I inflated my Mk3C and removed my helmet.* Momentarily the chute took tension on the harness, but I immediately released the shoulder rocket jet fitting. Somehow my feet and lower legs had become entangled in shroudlines probably as I kicked my feet to bring myself to the surface and positioned myself in the water. Initially I tried to free myself by bending forward and attempting to take my feet out of the shrouds much as you would take off trousers. The shroudlines, however, had enough tension from the chute so that they clung to my boots and ankles and I couldn't free myself. Also, I found that the inflated bulk of my Mk3C life preserver prevented me from reaching my feet. I unsnapped the upper fastener of the Mk3C for freedom of movement and took my survival knife from its sheath in a zipper pocket on my right thigh.

"I began cutting shroudlines attempting to free myself from the tug of the parachute. I had by this time unsnapped my lower rocket jet fasteners and released the uninflated raft as the helo was overhead and my concern was no longer the 'long term' float but the 'short term' problem of freeing myself from the light but constant and irritating tug of the parachute so I could be hoisted aboard. It took about 10 minutes of cutting before I was completely free. In fact there were still lines clinging to me when the helicopter began to hoist me.

"During these 10 minutes I found it necessary to use both hands to gather handfuls of shroudlines and cut them. Once I tried to return my knife to its sheath to free my hands but I found that I couldn't get the knife into the sheath due to various difficulties —bobbing in the water, wet sheath, retainer strap in the way, life vest bulk . . . I had a lanyard secured to the knife and found it very convenient to simply drop the knife when I needed both hands for some other tasks, then to retrieve the knife by the lanyard when I needed it for work. I strongly recommend that all pilots secure all gear of this nature to some point on their flight clothing or torso harness. Since this accident I have talked to another pilot who found he had to carry the knife in his teeth in order not to lose it under similar circumstances. He now has a lanyard attached to his knife.

"The sight of the helo overhead throughout my time in the water was most reassuring. I knew he had me in sight and should the parachute shroudlines turn out to be more than I could handle, I was sure a signal for assistance would have brought the helo crewman down the sling.

"The helo pickup was easy. The pilot laid the rescue sling within easy reach and when I had my hands on it he gave me enough slack to slip into it easily. Return to the ship was quick and uneventful."

The pilot was wearing steel toed flight boots. The leather of the left boot was cut through to the metal toe covering and the metal was scored. The reporting flight surgeon felt sure this cut was sustained during ejection. If the shoe hadn't had a steel toe cap, the pilot's foot would have been injured seriously. ●

* The pilot in this case removed his helmet to improve vision and head movement so he could cut shroudlines. Because he had to use both hands he was unable to retain the helmet.

BLOWOUT!

By Lester Carlyle, Douglas Aircraft Co., Inc.

"Okay, Doc, tell me. Why is cabin pressurization like a woman?"

"Easy. They both give you a lot of comfort and understanding as long as they're treated right—and they can sure raise a lot of trouble when they're wronged!"

"So?"

"What you do with your wronged women is your business, but what happens in a decompression concerns us both."

"Listen, if I have a choice between a decompression or a . . ."

"Never mind, Don Juan—relax for a few minutes. You don't have that choice when a decompression occurs, so it might be a good idea if you knew what to expect."

"What's to know? If the can gets punctured, all hell breaks loose. I hear that some guys pass out, that your lungs get stretched, and various other unpleasant things like that. I think I'd rather not know!"

"You're the kind of guy that's just asking for trouble. A lot of misinformation and scare talk has persuaded you to get your head up and locked and to ignore the real situation."

"All right then—just what is the 'real situation'?"

"Well, the part about your lungs stretching is partially true. How much and how fast they stretch depends on the pressure that builds up in them from expanding gas and that depends on several other things. The amount of pressurization, the flight altitude, the cabin volume, and the size of the opening all must be considered in relation to each other. Unfortunately, the factual information on extreme human tolerance limits in decompression is scarce. Some of the most rugged testing was done at Wright Field during World War II. Under laboratory conditions, they subjected volunteers to various types of decompression. Damage of the sort anticipated in combat action was inflicted on pressure shells located in an altitude chamber. With a 7.5 psi differential, the subjects experienced decompressions from 8000 to 35,000 feet in less than 1/10 second?"

"Where'd they send the flowers?"

"Didn't need any, these decompressions were tolerated fairly well."

"Okay, but those tests were made with small openings. What happens in something like the A-3 (A3D) versions where we might have to open that lower escape door when we're carrying a big pressure differential?"

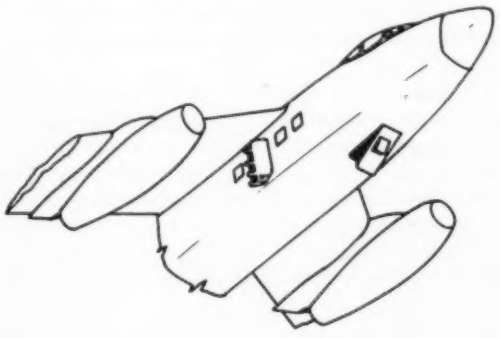
"By not-so-odd a coincidence, the people who make the A-3 (A3D) wondered about the same thing. They compared the worst decompression conditions attainable in these airplanes with the most extreme cases described in the aero-med journal and test reports. They decided that although safe limits wouldn't be exceeded, the margin of safety wasn't quite enough."

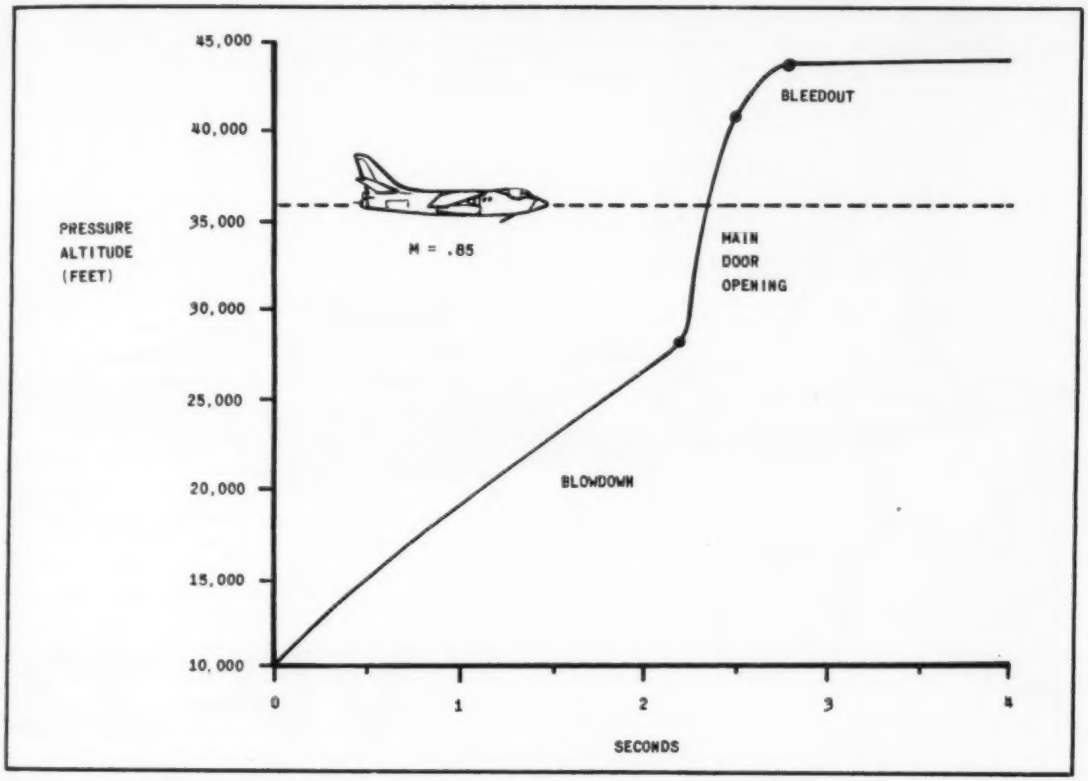
"Nice of them to care—did they do anything about it?"

"They sure did. A 10 x 12 inch blowdown door was installed in the main door. When either the main or side door handle is pulled, the blowdown door opens first and lets the cabin pressure drop for two seconds before the main door opens. This gets the inside pressure low enough so that when the larger door opens, the decompression is only a fraction of what it would have been otherwise."

"It sounds like a good idea. Does it work?"

"Yes. They ran a series of flights to check it out. Here is a pressure-time record of one of these flights in an EA-3B (A3D-2Q). The crews reported only moderate discomfort during the blowdown phase from noise, turbulent cabin air, mask blowby and draining of the lungs. The discomfort increased con-





siderably when the main door opened, but this part of the decompression lasted only 3/10 of a second. Everyone felt that they were in full control of their faculties the instant the suction let up, and none of them reported any injuries, soreness, or illness."

"Say, your graph shows the airplane at 36,000 feet but the final cabin pressure is listed at 44,100 feet. Who goofed?"

"Nobody. During the period shown in the record, the aircraft speed was kept constant. When the main door was extended into the airstream, a negative pressure area was created behind the door and the cabin pressure differential actually went negative with respect to the outside."

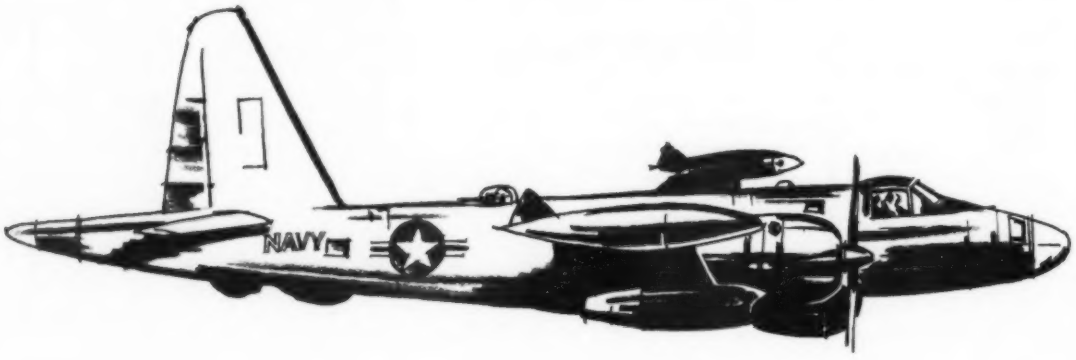
"There's still no sweat even at 44,000 feet if you're on pressure oxygen, is there?"

"Usually not, but on top of all the other excitement, the sudden change of oxygen pressure from less than 2 inches of water to 12 or 15 inches as the regulator senses 44,000 feet may cause just enough confusion to mess someone up. This happened to a man on one of these test flights. He was less experienced than the others, and when the higher oxygen pressure hit him, he didn't exhale hard enough to overcome the added mask pressure and close the inhalation valve. This led to shallow, rapid breathing and the first symptoms of hyperventilation. Luckily he had experienced the same difficulty in a low-pressure chamber flight not too long before the test and he recognized the symptoms. Deep, slow, forceful breathing got him out of trouble.

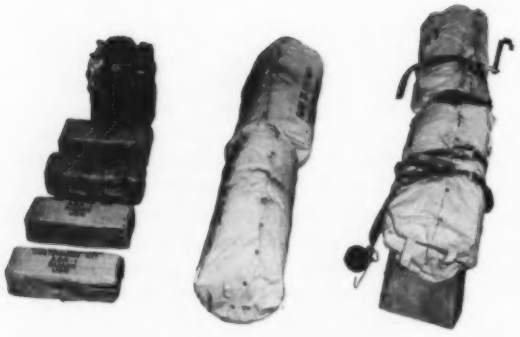
"An important thing to remember is that the cabin altitude can go well above the flight altitude under circumstances like the one I just described. If a pilot had experienced the breathing trouble and wondered about the increased oxygen pressure, he might have glanced at the cabin altimeter, seen that it was way higher than the flight altimeter, assumed that it broke during the decompression, and hyperventilated himself into serious trouble."

"Holy mackerel, Doc, it's guys like you that take all the fun out of flying—but we appreciate it. Well, I've gotta run. By the way, how come you know so much about wronged women?" ●

Endorsers and forwarding authorities are enthusiastic about the PatRon 22 SAR Drop Chute Project which has been passed to BuWeps for test and evaluation as a means of increasing the SAR capability of the P-2 (P2V).



VP-22 DROP KIT



The SAR drop chute is loaded with two fully equipped interconnected Mk VII life rafts. Four emergency ration kits and a Gibson Girl with parachute augment the regular Mk VII life raft supplies.

Search and rescue is a task which has traditionally been assigned to patrol squadrons. Multi-engine, long range, all weather patrol aircraft manned by large crews lend themselves to this work, a major factor being their ability to carry extensive SAR equipment. However, increased demands for antisubmarine warfare equipment in present day aircraft have created SAR equipment stowage and delivery problems. Toward a solution to this situation, Patron 22 developed equipment and procedures for dropping interconnected inflated life rafts.

The SAR chute, constructed of aluminum braced with 1" angle iron, minimizes the stowage problem and maximizes delivery versatility. Two fully equipped Mk VII life rafts can be dropped interconnected with 300 ft. of floatable high visibility line. Multiple drops can be made by reloading in the air.

By using this method of delivery, other assigned tasks are not compromised and the radius of action of the aircraft is not reduced. Simplicity of construction and use is the key to the efficiency of the drop chute. The chute and SAR equipment can be loaded in the aircraft in less than five minutes. A special cart developed by the squadron further reduces loading time. The equipment can be stored in a designated location until it is needed on an SAR alert, reducing the upkeep while increasing equipment life.

The SAR drop procedures are very basic and require no special training. Rafts are dropped upwind of survivors and drift down on them.

The drop chute hangs over the aft-entrance hatch for delivery and then swings up and latches to the overhead. (Detailed specifications on chute and drop procedures are included in ComFAirWing TWO Instruction 3130.1.) Not only has the chute proven a highly reliable delivery assembly, but it also is an effective stowage assembly for two Mk VII life rafts.

The basic SAR equipment comprises two sets of two interconnected, fully equipped Mk VII life rafts. As a last resort the two aircraft rafts can be used, making a total of six Mk VII life rafts available for SAR purposes. This equipment is rated for 42 survivors but can accommodate more. Once the survivors are in the life rafts, a major step in the rescue has been taken. However, since the problem of sea survival can be a severe one, four emergency ration kits and a Gibson Girl with parachute are included in the SAR equipment to augment the regular Mk VII life raft supplies.

How are the rafts inflated? The interconnecting line between the two rafts is packed using hesitation loops held together with rubber bands and stowed in a breakaway canvas container manufactured locally. The container has a four-sectioned triangular top designed to open when pressure is applied to the line as the first raft is released. When clear of the aircraft, the rafts are inflated by means of separate lanyards, 10 feet long, each attached to the aircraft. The first raft is released using a safety belt quick release. The second raft is released by a tapered pin and a 4-foot lanyard attached to the first raft.

When lives are at stake it pays to have the best and Patrol Squadron 22 considers the SAR drop chute to be just that.

* * *

(Ed.'s Note: PatRon 22 personnel instrumental in the project were CDR Clifford E. Olsen, former squadron CO, now at BuWeps; LT Russ Hammond, safety officer; and LTJG Harvey Heintz, aviation equipment officer.)

The SAR drop chute loaded with two rafts is secured to the aircraft structure at station 586. It is constructed to hang over the aft-entrance hatch for delivery and to swing up and latch to the overhead for storage.

The line connecting the two life rafts is packed using hesitation loops in a canvas container designed to open when pressure is applied to the line as the first raft is released.

An ordanceman wearing a safety harness stands by with the SAR drop chute in position for release.

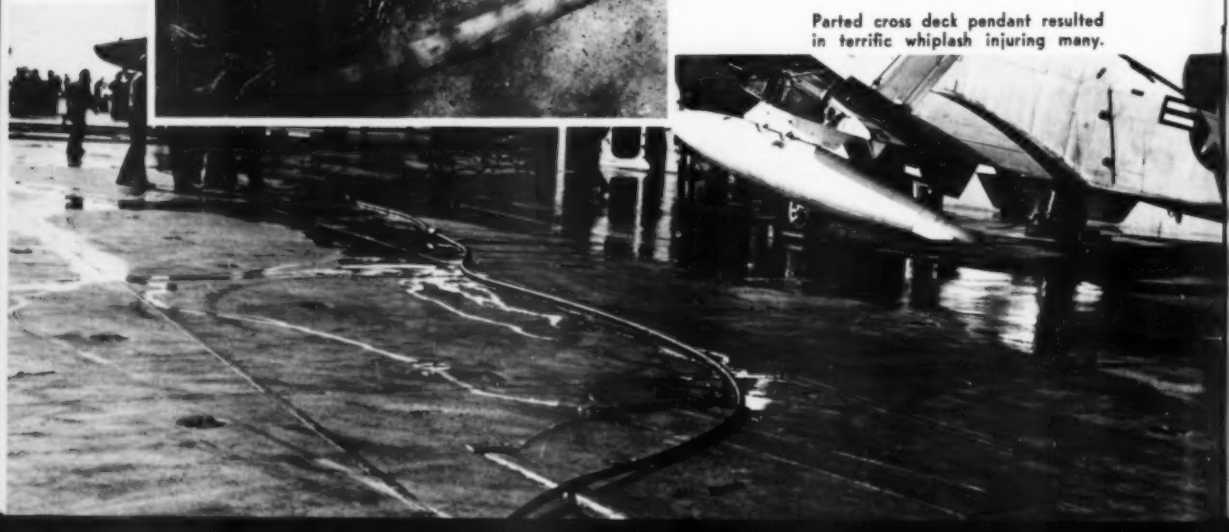
First Aid Training Pays Off!

INITIAL and repetitive training of naval aviation personnel in first aid is a vital and continuing requirement. The payoff is lives saved in times of emergency.

THE REWARDS resulting from such training were exemplified in the aftermath of a flight deck accident aboard the USS CONSTELLATION earlier this year when a cross deck pendant parted during an F-4 (F4H) landing.

The terrific whiplash of the parted pendant resulted in numerous casualties. Flight deck personnel reacted instinctively and instantly, unconsciously drawing on first aid training, as they went to the assistance of their stricken shipmates. Praise for flight deck and medical personnel's response to the emergency came from Vice Admiral P. D. Stroop, Commander Naval Air Forces Pacific, in a message to the ship:

> Reports from Balboa Naval Hospital indicate that expeditious manner in which your medical department and flight deck personnel reacted in recent accident directly contributed to the saving of lives of your shipmates. There is no question about the superb performance that these people gave. With more casualties than medics to assist, the burden fell on their shipmates. The race across the flight deck while tearing their belts from their person for tourniquets reflected split second action in applying necessary first aid which undoubtedly saved many lives. Instinctive reaction, leadership and training met the test 'under fire.' The friends and families of the injured will be eternally grateful to all. I wish to add my high praise to these men for a most outstanding performance, and commend them for their prompt and decisive action. Well Done. *VADM Stroop.*



Parted cross deck pendant resulted in terrific whiplash injuring many.

Preparedness

A P2V crew of 13 survived a ditching at sea without so much as a minor injury. Primarily this was accomplished by clear thinking and decisive action on the part of the pilots who performed a technically perfect ditching. Secondarily this was accomplished because the crewmen were prepared. Schooled with frequent ditching drills, each man assumed his proper ditching station, positioned himself correctly and finally made a rapid, organized exit with a very minimum of confusion.

The crew should be congratulated on their high level of readiness . . . as exemplified by their use of the hardhat, an item of protection of real use in a rough ditching. A P2V crew uses a hard hat only on takeoff, landings and ditching drills. It represents a piece of excess baggage to most crewmen in the cramped confines of this aircraft yet, when they were really needed, 12 of the 13 crewmen had them.—*Flight Surgeon in MOR*

No Safety Fence

THE pilot was performing a preflight inspection prior to manning his aircraft for a night launch from the carrier. The aircraft was parked forward on the starboard side of the flight deck adjacent to the No. 1 elevator with the port engine nacelle directly over the edge of the elevator. Although the elevator was down, the safety fence was not up.

The pilot knew the elevator was down but instead of using his flashlight to check the area, he depended on feeling for the safety fence to protect himself. As he inspected the port engine, he fell into the open elevator to the hangar deck below. His right leg was broken.

Oxygen Regulator Fire

WHILE the front seat pilot was occupied in T2V prestart procedures, the rear seat pilot was checking his oxygen system. The oxygen system was turned ON, *with the mask held away from the face,* and the safety pressure valve actuated. There was a mild explosion followed by fire in the rear cockpit.

After attempts to turn off the oxygen at the regulator failed, the pilots evacuated the aircraft. The rear seat pilot sustained minor burns of the left hand and leg. A more severe explosion occurred after the pilots evacuated the aircraft. The aircraft received CHARLIE damage. (It was suspected that oxygen combined with an unknown combustible material entrapped in the open end collar of the plastic inhalation assembly). *The pilot used proper techniques in holding the mask away from his face while checking the oxygen system.* It is considered that pilot injuries were minimized by the good habits being practiced by the dual pilot.

Action. It is recommended that unit Commanders reemphasize the proper techniques for checking the oxygen system. Inspection of hoses should be done at least at major calendar inspections.

—*3rd MAW El Toro*

Oxygen Usage

INVESTIGATION of an A3D-2 landing accident which occurred at night disclosed that some crewmembers removed their oxygen masks to smoke at intervals when oxygen was in use by other crewmembers. The reporting flight surgeon points out the dangers in this:

- The hazard of an in-cockpit fire.
- The effect of smoking on night vision due to the mild hypoxia induced.
- The risk of sudden loss of cabin pressurization and resultant hypoxia.

The third crewman removed his mask at 10,000 feet cabin altitude for no reason except that he "usually does so during approaches."

Double Feature

THE .38 cal. pistol with tracer bullets proved to be an extremely effective signal device under the conditions prevailing at the time of this accident—that is, under night conditions with good visibility.

The tracers are of value as an auditory signal even under conditions of impaired visibility. When used as visible signals as here, the tracers appeared to be the most effective of all the devices used when seen from a distance. The tracers were readily visible to me from the flight deck some 5½ to 6 miles distant and served to pinpoint the survivors better than the flares which could be confused with the smoke lights which had been dropped.

—*Flight Surgeon in MOR*

Handy Knife

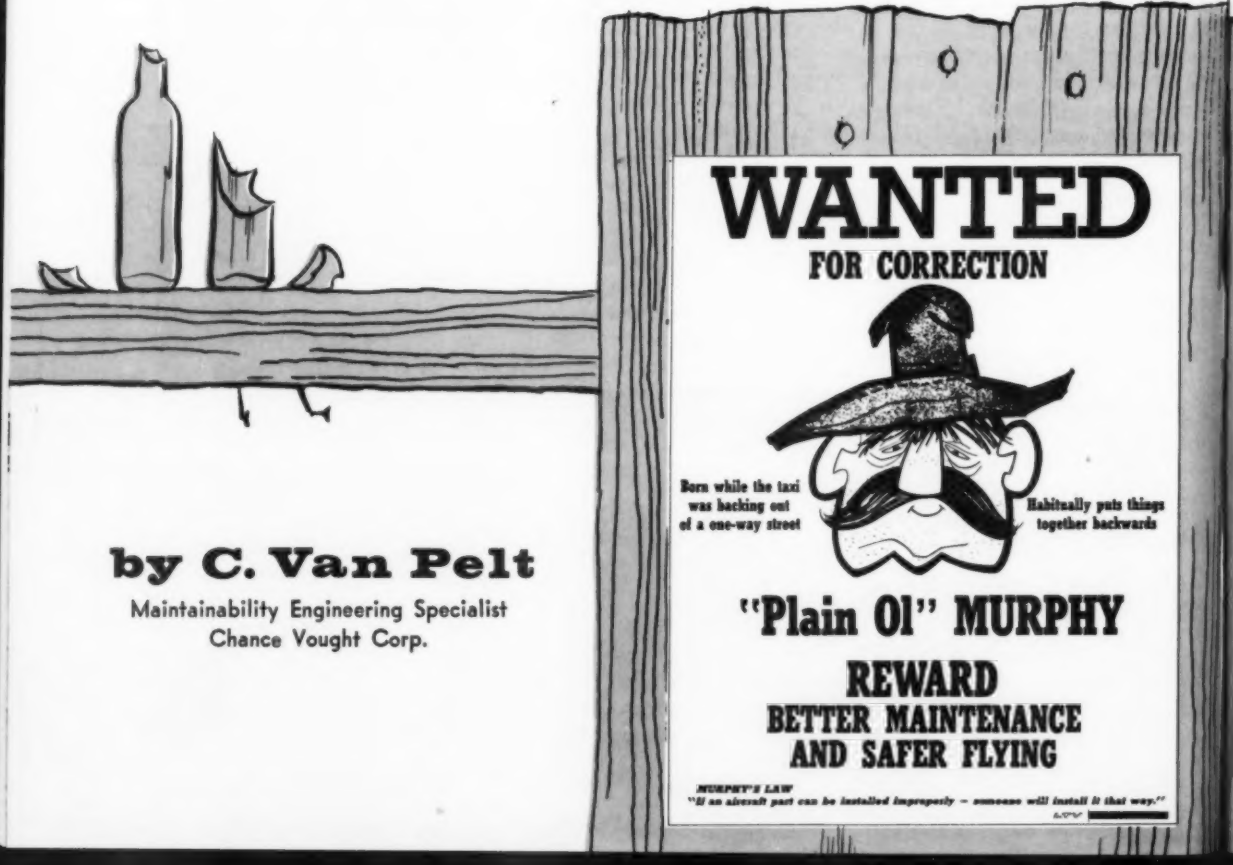
WHEN a P2V-4 ditched the crew escaped and boarded the Mk-7 and Mk-4 life rafts. As they started away from the aircraft, they discovered that the Mk-7 was still secured by its line. One of the men took his survival knife. cut the line and the raft was paddled away. ●

The Irish Menace

by C. Van Pelt
Maintainability Engineering Specialist
Chance Vought Corp.

One study shows that about 8% of all naval aircraft accidents are caused by maintenance error. Probably the best definition to date of the cause for maintenance error is Murphy's Law, which states *"If an aircraft part can be installed incorrectly someone will install it that way."* Consequently, many maintenance errors are simply called Murphys. There is also a corollary to Murphy's law which says, "If you think that an aircraft part cannot be installed incorrectly, just wait a while and someone will install this part incorrectly."

In recent years, there has been a tendency to make specialties of recently derived techniques. This is in general, I think, necessary. Examples, of course, are Reliability and Maintainability. Once these special-

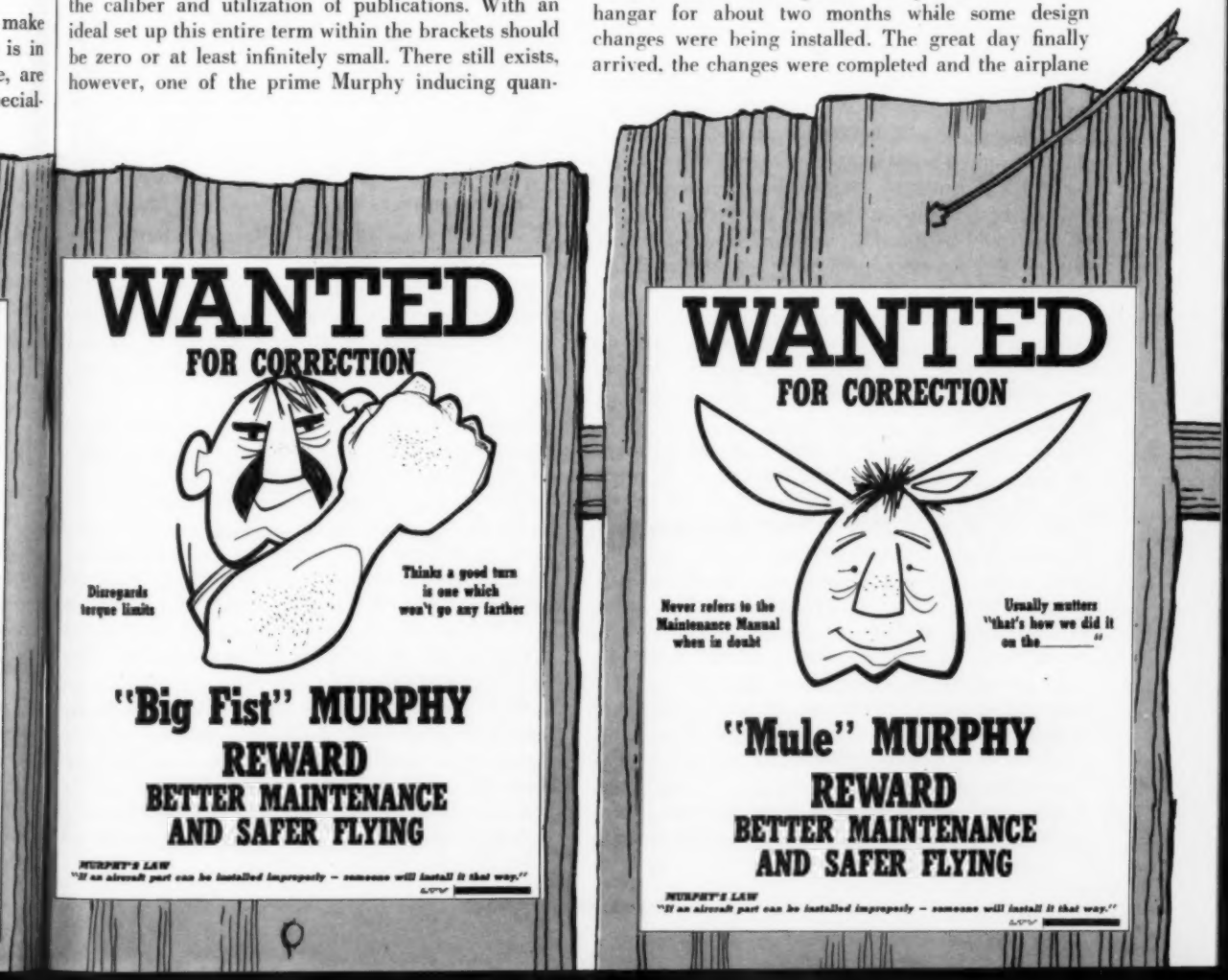

WANTED
FOR CORRECTION
Born while the taxi was backing out of a one-way street
Habitually puts things together backwards
"Plain Ol" MURPHY
REWARD
BETTER MAINTENANCE AND SAFER FLYING
MURPHY'S LAW
"If an aircraft part can be installed improperly – someone will install it that way."

ties are defined the academic mathematicians start to write equations that the practitioner frequently has difficulty in applying. To head off this situation for "de-Murphy-ability" let us write our equation now.

$$M = \left[\left(\frac{UM}{SM} + \text{Effect of Pressure}\right)\frac{1}{\text{Supervision} + \text{Publications}}\right] \text{Design Murphy Factor}$$

In this equation M is the number of Murphys UM—number of unskilled mechanics. SM—number of skilled mechanics. Then the next term "effect of pressure is pretty obvious. Two other factors that must be considered then are the caliber of supervision and the caliber and utilization of publications. With an ideal set up this entire term within the brackets should be zero or at least infinitely small. There still exists, however, one of the prime Murphy inducing quantities which we will call the Design Murphy Factor. Obviously a design that has a high Design Murphy Factor will cause more trouble than one with a low Design Murphy Factor. Now this is partly in jest but as we go on you can see that there may be truth as well as humor in this equation.

A few years ago the pride of our corporation was a transonic jet fighter. Although not delivered in large production quantities, it was a significant breakthrough in many respects. One of these machines, used as a flight test airplane, was in the hangar for about two months while some design changes were being installed. The great day finally arrived, the changes were completed and the airplane


WANTED
FOR CORRECTION
Disregards torque limits
Thinks a good turn is one which won't go any farther
"Big Fist" MURPHY
REWARD
BETTER MAINTENANCE AND SAFER FLYING
MURPHY'S LAW
"If an aircraft part can be installed improperly – someone will install it that way."
WANTED
FOR CORRECTION
Never refers to the Maintenance Manual when in doubt
Usually mutters "that's how we did it on the_____"
"Mule" MURPHY
REWARD
BETTER MAINTENANCE AND SAFER FLYING
MURPHY'S LAW
"If an aircraft part can be installed improperly – someone will install it that way."

towed onto the flight line for its first engine run. After the engine was started the plane captain experimentally pumped the brake pedals and hydraulic fluid squirted from the *pitot* head. If you were as familiar with this plane as I you would agree that the prime cause of this Murphy was the Design Murphy Factor. Believe me, we have learned a lot about simplification design since that time.

Take another case, after completing bounce drill a pilot entered the pattern to effect a final landing. All was well, 1500 lbs. of fuel showing in the main cell, when the engine flamed out. After a few rapid and futile attempts to restart, the pilot successfully ejected and the airplane made an unsuccessful and catastrophic landing in a farmer's field. A study of this accident showed that this RF-8A (F8U-1P) was flying with an F-8A (F8U-1) main fuel quantity gage. Further, although some people knew this had been done, no one had bothered to check the gage indication when the fuel cell was empty.

After the dust had settled the gage was installed in another RF-8A (F8U-1P) and checked. Lo and behold, when the gage indicated 1400 lbs. the main fuel cell was empty. There was some question about the coding of this part in the parts breakdown but even so no real justification for not checking the fuel cell empty reading could be found. Two things show up in this case; it was considered a must to get this airplaine flying and short cuts were accepted. Further, the maintenance instructions were left to gather dust in the maintenance shack. Three of our equation factors to show up were effect of pressure, minimum supervision, and no use of a pretty good maintenance instruction book.

Then there's the case of the wing cell pressure regulator. This device regulates pressure in the wing fuel cell by comparing the pressure in the cell to outside air pressure. There are two ports on one end of the regulator. One reads wing cell pressure; the other reads outside air pressure or ambient pressure. Unfortunately in our original design these tubes paralleled each other and when a regulator was replaced you had a 50-50 chance of connecting the right line to the right port. After some serious grief with this situation we changed one of the tubes and changed the fitting that connected the tube to the regulator so that the two tubes no longer looked alike. Then guess what happened?

When the regulator was removed for replacement or repair the two fittings (one 90° and one 45°) were removed from the old regulator and installed on the new one. Once again 50-50 chance. To head this off we then redesigned the regulator so that one port now was $\frac{3}{8}$" port, the other was the old $\frac{1}{4}$" port. This should have solved our difficulty. We could install the tubing in our delivered airplanes, however, we could not get regulators of the redesigned type immediately. So we had to use a $\frac{1}{4}$" to $\frac{3}{8}$" adapter to connect the $\frac{3}{8}$" line to the port on the regulator. Don't you know that in at least one case the $\frac{3}{8}$" line was still directed to the wrong port because somebody went to the hydraulics shop and got several adapters to assure that the lines could be crossed. Of course, with the advent of the final regulator our problem was eliminated.

There is one other story connected with this regulator, the ambient line, for reasons of proper construction terminated in a bulkhead union in the wheel-well. We looked at this and said, "somebody is going to try to put a cap on this," so we put a guard on it. Well naturally, somebody put a cap on it in spite of the guard. So we finally designed a special termination for this line and today a person would have difficulty in "Murphying" this installation. You can see this particular case involved most of the factors of our Murphy equation.

Now let's examine some of the causes of Murphys:

First of course, is lack of skill or familiarity with the work that is being done.

Next, of course, comes supervision. Adequate supervision and quality assurance will assure that the work is adequately checked and Murphys uncovered before somebody gets hurt and the taxpayers get another big bill.

Pressure is one of the factors in our equation. It has some interesting aspects. If there is not enough pressure psychologists tell us the error rate goes up and we must continually challenge the human being or he doesn't perform too well. Then, of course, when there is too much pressure people will become tired, frustrated and preoccupied with the cause of the pressure and the error rate goes up. In most cases probably control of pressure is out of our control but supervision undoubtedly can moderate the effects of either extreme.

Then come publications. What can be more defeating than carefully following published instructions only to find that they are wrong. The next worse thing, of course, is to find that you thought you knew the instructions, followed your memory, and then when you dig the smouldering parts out

Backward Filter

WHILE troubleshooting a *T-Bird* discrepancy which read: "Unable to transfer last 150 lbs. of fuel in tiptank," mechanics found water, fuel and dirt in the hot air filter. Checking further, they found the hot air filter installed *backwards* in relation to the air regulator (see photo). Note the positions of the outlet and inlet ports of the part labeled hot air filter. This situation will not affect tiptank transfer until the filter becomes clogged. With the filter clogged and installed backwards the bypass valve will not function, which then causes loss of tiptank transfer.

Proper installation of the filter requires the inlet and outlet ports to be aligned just 180 degrees opposite this illustration.—*J. M. Smith, NATSF*

of the crater and check them you find that your memory had failed you.

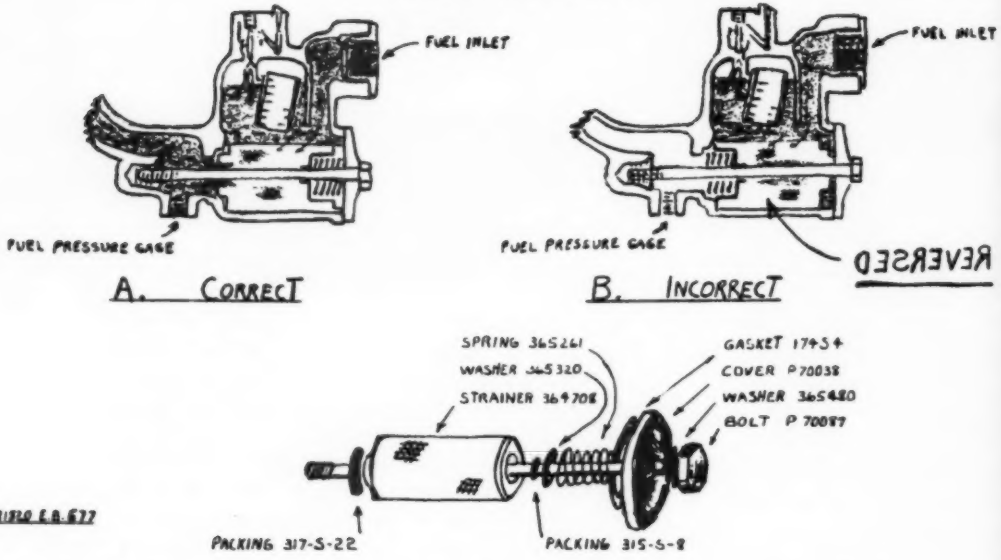
There is a tendency within the noggins of some people, identified by psychologists as the reversal tendency for which there is no cure. These people have a tendency to get their right and left mixed up, to confuse OFF-ON position of switches, valves, . . . , and, if left on their own, can cause considerable grief in spite of their higher than average intellectual capabilities. . . . Supervision properly informed of this tendency can help prevent the catastrophy that this tendency invites.

We still must consider the design as a fundamental cause of Murphys. Designs where different electrical or fluid connections are made in identical fashion inviting crossed connections. One switch or valve that is ON in one direction and a valve or switch nearby that is OFF in the same direction. The bellcranks that can be installed upside down so that the linkage goes overcenter or the mechanical advantage changes and so on. Then the invitation to Murphy is engraved and the designer, even without an RSVP, can expect a reply.

Now there are things that can be done to curtail the menace of Murphys. First is to "Murphy-proof" the design while it is still on paper. This calls for an objective study of the design by people who have seen and maybe even created or committed a few Murphys of their own. The WRAP (Weapons Readiness Achievement Program), with its emphasis on design for maintenance and improved publications, can well be the Fleet's greatest asset since the advent of Murphy's Law.

Even with these advances it will remain for each squadron to review their procedure to assure that adequate attention is given to the details of completing a given task, that Quality Control is given the caliber of manpower and the management support to assure a thorough check of every aircraft part installed to assure that it is installed correctly.

Backward Strainer



ONE of the Quonset-based VS (S-2 aircraft) outfits pulled this one recently: By reversing the carburetor inlet strainer they effectively sealed off the fuel supply to the carburetor. The engine ran at 1000 rpm, but upon increasing power the engine died as fuel pressure dropped rapidly.

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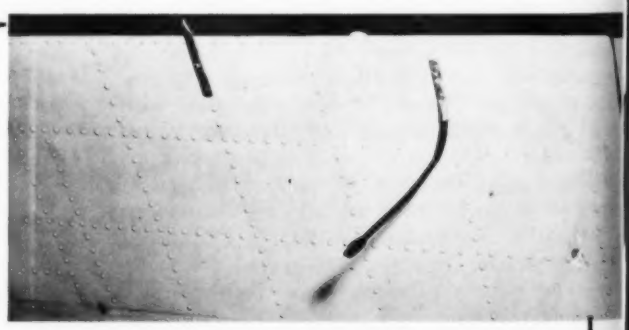
Inspecting for contamination of the strainer, the mechanics removed it and found it deformed but not contaminated. They then straightened it out and reinstalled it backwards again. Needless to say the symptoms were the same. The error was not discovered until the carburetor was removed and turned into the local O&R for a flow check.

This case will not involve a safety of flight since the RPM obtainable would not permit high power; however, many man-hours and aircraft availability were lost.—*C. Durtche, Jr., CDR, Maint. Officer, ComFAirQuonset/ComNABs*



THOT WE'D SEEN 'EM ALL—But here's a static discharge wick installed backwards on the aileron of a T-28! We figure the victim of Murphy's Law in this case must've been left-handed and working in total darkness to have missed the one correctly installed. For those who might not know which one that is—it's the one coming off the trailing edge (upper left).

Fuel Contamination

Tankers Transfer Trouble

RECENT discoveries of microbiological fuel contamination in attack aircraft led investigators to the source. Tanker aircraft had passed contaminated fuel to receiving aircraft during air refueling operations. Contamination has been described as gray jelly-fish-like substance, slime or scum bubbles. Size has ranged from barely discernable to ¾-innch in diameter jelly-fish.

Since fungus and bacteria thrive in warm humid climates, fuel systems of recently deployed aircraft or aircraft that have been engaged in aerial refueling should be subject to close surveillance.

The Second MAW reports that experience to date reveals the first indication of contamination is an unexplainable malfunction of the fuel probes. This can be corrected by removal and drying of the probe. Contamination should be suspected and an inspection of the fuel system including tanks, sumps and filters be made upon encountering an undetermined fuel indicating discrepancy.

An A-4 squadron has also experienced deterioration and failure of the fuel probe support grommets. Investigation indicates the most probable cause is impregnation and attack by microbiological organisms.

It was recommended that all persons concerned with fuel handling review BuWeps Instruction 10340.5 and place particular emphasis on:

- Having only qualified persons perform the required preflight sampling of aircraft fuel systems.
- That only clean clear glass containers be used for sampling and visual inspection.
- That a close inspection for evidence of contamination be performed on fuel filters during periodic inspection.

When fuel contamination is attributable to air refueling that reports made promptly to the cognizant authority.—*CG Second MAW msg 221830Z Jan '63*

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Keeping Jet Fuel Free of Contaminants

NEGLIGENCE can be defined in many ways. One definition might very well be, "the faulty protection of jet fuel which permits impurities to accumulate in storage tanks." This is a serious waste because it can result in fuel tank corrosion, fuel gage malfunctions and other fuel system difficulties in aircraft. These deficiencies in turn may lead to loss or damage of aircraft and property, and injury or death to personnel.

The most common contaminants of aviation fuel are water, solids, surfactants and microorganisms. The Fuels and Lubricants Division, Directorate of Defense Research and Engineering, recently suggested these control methods:

Water

Adequate tank settling time, proper design of tank roof drains, periodic drawoff of water bottoms from tanks, and use of water separators and coalescers help. But the most important precaution is constant care and vigilance to assure good housekeeping practices.

Solids

Simple settling is the most effective and reliable method for removing, but filtration of flowing streams is also practical. Again, good housekeeping to assure cleanliness is the best control.

Surfactants

(A recent recognized problem in which surface agents disperse solids and water throughout the fuel so that removal becomes difficult)—Studies are being made to determine methods for recognizing and controlling this problem.

Microorganisms

Research has not yet produced suitable bactericides or fungicides for controlling these, but generally it has been found that effective control methods for other contaminants reduce the microorganisms problem to a tolerable level.

It all adds up to this: Be thorough in application of presently recommended control methods, enforce good housekeeping practices, and your fuel will remain reasonably free of contaminants. —*TIG Brief*

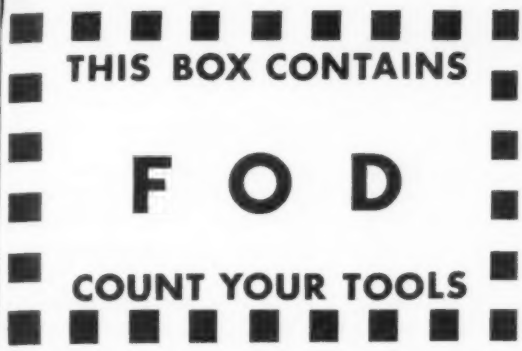
By Captain R. L. Gallant, USMC

Two strikes and two fatalities in two recent months involving two F9s went on the record as "Undetermined." Conclusive evidence of cause was lacking, but each revealed a wrench in the smoking hole. Here, an old-timer presents some good dope on how to cope with

MISSING TOOLS

Functionally, and by design, the common hand tool used in large number by the aircraft mechanic is an instrument of construction and not of destruction.

In the hands of a competent mechanic these tools accomplish the tremendously important job of keeping thousands of aircraft flying safely. However, when used improperly, or especially when one is forgotten and left to float freely in the inners of an aircraft, this tool then becomes a veritable Mr. Hyde, symbol of madness, seeking and destroying what seems its natural prey: the delicate, sensitive and vital mechanism of any control system. The event is filled with terror as the pilot discovers that his controls are frozen, held in the strangling grip of a small tool that now is wedging itself deeper between an aileron control bellcrank and a control cable. The die is cast and fate of both pilot and aircraft are in the hands of the gods. The consequences are often



YOURS FOR THE ASKING—Klingstick tool count reminders similar to this illustration suitable for application on the inside lid of mechanic's toolboxes have been printed and distributed to all Aviation Safety Officers. Additional labels may be had by letting us know of your needs. Write Commander, Naval Aviation Safety Center, Norfolk 11, Virginia.

violent and tragic, measured in terms of lives, injuries and aircraft destroyed or damaged.

The aircraft mechanic who cannot account for a missing tool, does, in effect, point the finger of suspicion at the aircraft which he has worked on last since his discovery that one of his tools is missing. This is a situation that calls for good judgement. To ignore the fact that a possible safety-of-flight discrepancy exists with the aircraft is a violation of a paramount rule governing the preparation of aircraft for flight. It would be foolhardy, if not indeed, downright dereliction of one's prime responsibility and duty to decide in favor of chance, for here the mechanic is gambling with great odds and high stakes. We will assume that our mechanics are capable of good judgment and therefore will not gamble with lives. No dice!

Certainly *before* the aircraft suspected of concealing the missing tool is returned to a flying status a thorough search everywhere is necessary. If the tool is not found, a search of the aircraft should be pursued with determination until the tool is found or until all doubts are removed.

A systematic and logical approach to this problem will help save time and confusion. First, determine the exact size, type and shape of this missing tool and associate it with particular jobs completed on the aircraft that day and which require use of this tool. This deduction process will narrow down the possibilities and permit the searching effort to concentrate in specific and logical areas. Blind and obscure places should be exposed to light; all openings in decks and bulkheads leading normally to closed areas in the aircraft should come under careful inspection.

Areas of the aircraft housing cables, push rods, bellcranks, pulleys, sheaves, levers, . . . are especially susceptible. Close inspection is required by sight and feel. By all means open every possible inspection and access port, and when warranted, remove decking and panels. Conduct a motion and travel check of all controls to insure complete travel and unobstructed operation. This last step sometimes helps to dislodge a suspended tool, although it must also be remembered that this movement can also cause a loose tool to jam. Care here is necessary to observe the slightest difference in "feel" of controls. Don't overlook the air inlet of jet engines, even if only a remote possibility exists. Those large wind pipes just seem to swallow up everything not well nailed down and, brother, how the dental work shows it. The damage a tool the size of an ordinary open-end wrench does while passing through compressor and stator blades is proof positive that the jet engine cannot live a normal life span swallowing tools.

The mark of a good mechanic is his attitude toward all aspects of his work. Pride in his work, attention to detail and a sense of responsibility are qualities to be acquired and developed early in this game. On the question of tools, in addition to using them properly and keeping them in working order the mechanic should maintain an adequate inventory in order to service and maintain his aircraft quickly and completely. Tool shortages are sometimes an indication of missing tools and this is inconsistent with "proper attitude" because missing tools too often are found jamming controls of aircraft.

To preclude possibilities of a missing tool remaining in an aircraft the following rules are suggested:

- An accurate inventory of tool boxes or tool carriers following completion of work on an aircraft will ensure that no tools remain in any aircraft.
- An aircraft suspected of possessing a missing tool should be grounded until the tool is found or all doubt removed that it is in the aircraft.
- Develop and practice the habit of orderliness when using tools. Return all unused tools to a tool box instead of scattering them about the job.
- Avoid carrying loose tools in work clothes. Not only is this a dangerous practice as it may lead to physical injury but it promotes possibilities for losing tools.

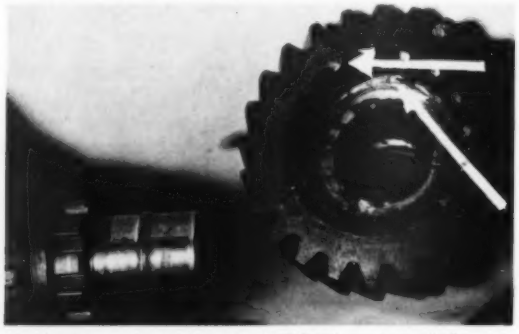
Account for that missing tool or stand prepared to account for that aircraft accident. ●

Greaseless and Driverless

THIS incident involves a driverless Consolidated NC-5 which jumped its chocks while supplying DC power to an aircraft. Brakes were set and gear shift lever was in NEUTRAL. While turning up at high RPM the drive shaft bearing suddenly froze to the drive shaft causing the hypoid gear to engage.

Follow-up investigation at GSE Maintenance revealed a damaged driveshaft and hypoid gear due to insufficient lubrication (see photo). It was determined the transmission plug was in place and that the vehicle had been properly serviced prior to the commencement of the day's operations. A small transmission leak was unnoticed during the many movements of the NC-5.

This near-accident points out the danger of leaving a running vehicle unattended. It also illustrates the importance of proper inspection and service of ground service equipment. *—Contributed by LCDR W. H. Mayo, Safety Officer, VQ-1*



Handbrake set, gear lever in NEUTRAL and chocked—yet, dry transmission gear caused runaway.

APPROACH Correction Notice

Top and center cutlines of photos depicting A-3 (A3D) throttle rigging on page 43 March '63 APPROACH are transposed. Top photo cutline should read:

PROPERLY rigged fuel control linkage at full throttle position;

Center photo cutline should read:

IMPROPERLY rigged fuel control linkage at full throttle.

Readers are asked to note same in all file copies. Current Handbook of Maintenance Instructions provide proper rigging procedure.

DIR Materials

IMPORTANT clues are often lost prior to malfunction investigations due to intentional and/or inadvertent actions by those submitting the material to be analyzed. To assure optimum results, all pertinent material should be forwarded in an "as is" state. Local personnel should not perform any tasks other than those required to forward the part/material to the designated evaluation activity.

When submitting material for malfunction investigation:

Do *not* attempt any degree of disassembly.

Do *not* make any adjustments.

Do *not* perform any type of cleaning, internally or otherwise.

Forward all failed fragments.

If feasible, forward attaching parts and/or other units within the system that contributed to the malfunction.

If contamination is suspected, forward samples of the oil, hydraulic fluid, etc., removed from malfunctioned system.

Provide sufficient background information.

Towing Accidents

THE following recommendations to eliminate aircraft towing accidents and to possibly prevent personnel injury were made:

(1) All universal aircraft tow bars used for nose gear towing be modified in accordance with CNAL Note 13053 of 12 January 1962.

(2) In the event of separation of aircraft from tow bar while towing aircraft, vehicle driver should speed up and leave a clear area in front of the aircraft so that the man in the cockpit can brake the aircraft and not collide with the tractor. This will eliminate possible aircraft damage in colliding with the tractor and possible injury to the tractor operator.

(3) Prior to each use, inspect the tow bar for sound material condition and do not allow an unserviceable tow bar to remain in the flight line area. *—2D MAW*

Tool Mods for the M-B Ejection Seat

Unmodified spanner wrench (M-B tool no. 6146)

Modified spanner with ⅜" drive socket permits use of torque wrench

A major contributing factor to proper maintenance of Martin-Baker Ejection Seats is the availability of proper tools with which to perform the maintenance.

To torque its primary firing mechanism, the auxiliary cartridge caps, drogue gun, and guillotine firing mechanism, maintenance personnel have designed and tried many devices and have found it is an unsafe and unwise practice to tighten the primary firing mechanism with an open-end or box end wrench. The possibility exists that the wrench may knock the firing sear out, thereby ejecting the seat.

To solve this problem we manufactured a wrench from a stock issue spanner wrench (MBEU 6146). The original wrench was cut in two, and a ⅜" drive socket welded to each piece, thus enabling them to be used with a torque wrench (see photo). Prior to actual use, the torque wrench with the modified tool should be calibrated.

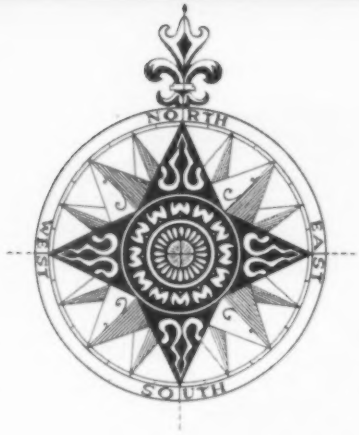
Two other useful modifications to Martin-Baker tools involve the Pin Protrusion Micrometer and the G-switch check gage. A standard stock Pin Protrusion Micrometer's body has too large a diameter, which prevents it from being used to measure the pin of the guillotine firing mechanism. There is sufficient metal on the body of this tool to permit machining to a diameter of .625 inches (+.00,—.003) and a length of 1⅝ inches. This length falls just short of the Allen set screw.

Since Martin-Baker company has reduced the wall thickness of the G-switch box excessive threads must be removed from the G-switch check gage. If the gage is used without first being modified, its threads will protrude into the box. When this occurs, the G switch lever strikes the end of the gage, peening it and making the tool inoperative. The gage was originally made with five threads on the threaded portion. This modification reduces the number to three threads. Maintenance personnel should inspect their gages for damage and ascertain that the excess threads have been machined off.—*Contributed by John T. Miller, AMHCA NAMTraDet 3007, Memphis*

Service Life of Escape System Ballistics

THE service life of the Frankford Arsenal ballistic devices is established at 5 years, beginning from date of manufacture stamped on the device and container. The installed life in Navy aircraft is established at 2 progressive aircraft rework schedules (PARS), but not to exceed 30 months. Devices are over age if either of these limits is exceeded. (Reworked devices have the same status as new devices.) Unless specifically informed otherwise, this also applies to incorporation of any Frankford Arsenal devices in Navy aircraft escape systems which are not now so used.

Future procurement and/or rework of these devices, procurement documents will specify that cartridges installed shall be furnished from lots manufactured within a year past, and the labels on the devices shall contain the cartridge loading date and lot number. *Ref. BuWeps ltr RMMO-332 JGB 7 Nov. 62.* ●



LETTERS TO APPROACH

Logging of Catapult Shots And Arrestments

Washington—Re article Jan 1963 issue which recommended that a column be provided in the flight section of the aircraft logbook to distinguish between carrier arrested landings and morest landings.

The proposed aircraft logbook includes a revision to aircraft flight log to provide an additional column for logging special information by the reporting custodian (e.g., catapult shots).

J. F. WITTEN
By direction
Chief, BuWeps

• Thank you—your report has been forwarded to cognizant authority. Refer to BACSEB 40-62 for more information on this subject.

Power Same

Kingsville—We refer to LT B. O. Bibb's article entitled, "The Great Murgatroyd Frunch (IFF) SIF Scandal," appearing in the February issue when he states that:

"(Low and normal actually refer to the power output of the transmitted signal. . . .)"

With due respect to LT Bibb's article, we find that according to the HSI 9AN 1630 APX-6-51, an oversight has occurred. In Sect. 2 of the manual—Page 10, Par. 2-11 Item D states:

"Transmitted power from the transponder is the same for both the Low and Normal positions of this switch."

We find that instead of having to do with the transmitted pulse, the LOW and NORM switches regulate the receiver sensitivity of the APX-6.

D. A. THOMPSON, AT2, VT-21
F. F. LOESER, AT1, VT-21

• Thanks gents! You are 100 percent correct. It is also gratifying to hear that APPROACH is reaching the AT shop and is being read.

Seals of Quality Assurance

Jacksonville—There is a good item on page 57 of the January '63 APPROACH. I think personal identification imprinted in the lead seals used on Martin-Baker seats is an excellent idea. We use the same thing in all our squadrons in the Jacksonville area. The details of our program are included in the enclosed NAESU report. This may be something that could be pushed on a Navy-wide basis.

J. E. SMERDON, JR.
ASO, Staff ComFAir Jax

Miniature ORI

FPO, San Francisco—The success of the helicopter accident prevention program is unquestionable and becomes more obvious month after month. The helicopter is not necessarily an inherently safe aircraft to operate and to quote an old aviation axiom, it is mercilessly unforgiving of human error. Nonetheless, accident rates in helicopter aviation have been steadily decreasing. Generally, these rates are well below the all-Navy aviation accident rates.

No matter what the reason, be it a superior accident prevention program, or just plain luck, the Marine Corps has a number of helicopter transport squadrons with outstanding safety records. This writer maintains an "HMM Totem Pole" and it currently reveals five Marine Helo transport squadrons operating HUS models with accident-free records ranging roughly from 19,000 to 35,000 hours. The writer's organization happens to fit in this totem pole; however, the statistics are maintained only for the purpose of "howgozit" rather than for establishing a squadron goal. It is the attitude and desire hereabouts that the relative positions and safety records of these five squadrons remain intact ad infinitum.

However, a new line of reasoning seems to be developing. The safety record, per se, and the accident-free hour statistic is being overemphasized. It seems that some folks are losing sight of the real purpose of accident investigation and reporting. "Absolved of the responsibility for safety award purposes" seems to be a goal of some accident boards these days. "How can we downgrade this to an incident?" is another. The attitude appears to be that there is too much to lose by assuming the responsibility for an aircraft accident. The pity is that the fear seems to be of dropping out of the big race rather than that of suffering a loss of combat potential or the taxpayers' money.

Should there be a new, tougher yardstick for measuring performance? Possibly it's time for a new set of criteria other than the number of days since the last accident or the current number of accident-free hours.

Here are some suggestions. The first one is an across-the-board de-emphasis of safety "records" to relieve the pressure on the individual command. This might even extend to the realm of the CNO Safety Awards. Next, the inauguration of an annual "meet" to satisfy the competitive spirits in the helicopter business is suggested. This would compare with the weapons meets in which our high-flying zoomie brothers engage each year. Duties of hosting this contest could be rotated from coast to coast and only crews would be sent from the visiting participating squadrons. The host aircraft would be flown by all hands to eliminate the impracticality of flying helicopters excessive distances. Phases of flight such as day and night troop lifts, external cargo lifts and LPH operations, actual or simulated, would be included with a practical scoring system devised so as to grade each team. For example, a difficult night troop lift might be planned and each team would fly the mission on successive nights. Such items as elapsed time for the mission, total time in the landing zone, radio discipline, air discipline, briefing and debriefing might be judged. This takes on the appearance of a miniature ORI and could probably be adapted to fit

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

the requirements of a similar "meet" involving our USN comrades and their HSS types.

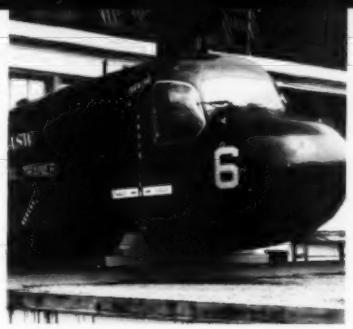
This is just the initial general idea and might prove impractical when reduced to the minor details; however, it's submitted for comment.

R. E. DYER, CAPT
U. S. Marine Corps Reserve
Safety Officer

• **The floor is open for discussion.**

Build Tracker Trainer

South Weymouth—Because of a little foresight and imagination on the part of LCDR Paul Le Blanc and his team of ASW instructors, Naval Reservists are flying a new ASW Tactical Trainer. The aircraft, a twin-engine S-2 (S2F) *Tracker* was listed as a strike after a crash landing here last spring. Instructors of the ASW Section recognized the potentials of this aircraft as



a tactical trainer and set out to salvage the forward fuselage section and all electronics equipment.

As a new aircraft, the *Tracker* cost approximately one-half million dollars; as a "strike" it was practically worthless. Reclaimed from the graveyard—"reincarnated" in a sense—as an S-2 ASW Tactical Trainer at an installation cost of $1100, it is today accomplishing a job somewhere near 80 percent comparable to a one and one-half million dollar S-2 Operational Flight Trainer—an elaborate Navy training device unobtainable by the South Weymouth Naval Air Station.

The entire tactical problem is conducted by South Weymouth's qualified and competent ASW instructors, and "flown" under actual flight conditions by complete *Tracker* flight crews of the Weekend Warriors, operating in their familiar aircraft positions and environment instead of an unrelated classroom.

With this new trainer, our ASW Training Program equals any, and far surpasses many present existing ASW training devices and equipment systems within the 18-station Naval Air Reserve Training Command. It is believed the trainer will improve air crewman training 100 percent and at a cost of pennies as compared to the $23 per hour of actual flight.

LCDR Le Blanc has this to say about his brainchild, "This new improvised and authentic Tactical Trainer is producing the desired results of antisubmarine warfare training, resulting in increased readiness which exceeds the expectations of CNAResTra Aircrew Training . . . the ultimate in VS training!"

DICK WOOD, JO1

Material Reliability and BIMRAB

NAVAL AVIATION, specifically the Naval Aviation Safety Center and the Bureau of Naval Weapons, has long recognized the need for improved aircraft component material reliability.

As a result, the Bureau entrusted this program to a joint board—the Bureau-Industry Material Reliability Advisory Board (BIMRAB)—which through the board itself, its committees, bulletins and annual conferences has heightened interest and action towards the goal of increased reliability in naval aircraft systems for the past several years. The most recent conference was held in November 1962 in Washington. The theme was "Industry Advises the Chief."

A keynote speaker at this conference was the head of the Center's Maintenance and Material Department, CDR N. R. Quiel. He presented an audio-visual report on the relationship between material reliability and aircraft accidents, which listed material failures and malfunctions as primary cause factors in nearly a third of all naval aircraft mishaps—as well as among the several causes involved in a number of other accidents.

Thus, from these causes alone, there were nearly 200 serious accidents, resulting in the death of some 50 pilots, and damaging or destroying around a hundred million dollars worth of hard-to-get aircraft. Unfortunately, the present trend is not favorable. And so, increased emphasis needs to be put in this area.

With each accident costing in the neighborhood of a half million dollars, the prevention of even one accident becomes an important matter.

Unclassified copies of the many excellent papers advising the Chief on the Navy's reliability problems presented at the conference can be obtained from *Secretary to BIMRAB, R-43, Bureau of Naval Weapons, Washington 25, D. C.* The book, for official use only, also contains pertinent information on BIMRAB as established by BuWeps Instr. 5420.3B of 7 June 1962.

(For a related item on reliability, please see the editorial on the inside back cover of this issue.—Ed.)

approach

THE NAVAL AVIATION SAFETY REVIEW

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Inside Back Cover: Lift & Drag

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

What is

THE ANSWER

to

The Maintenance Error Problem?

THE major feature opening this issue is Maintenance Error Elimination.

If we continue to have such problems caused by errors during maintenance and inspection of aircraft as are discussed in the article, is there any corrective answer other than increased supervision and training of maintenance personnel? YES—we can reduce the number of times the mech has to unbutton and check various components, or service or lubricate them.

How can we do this?—not by any arbitrary means surely. But we can if we increase the service life, *the reliability*, of various aircraft components. This reduces the opportunity for mistakes to be made, and at the same time it is bound to reduce the number and frequency of times in which pilots are confronted with airborne material failure emergencies.

The basic lifeblood of a reliability system is a continuous flow of accurate data on what failed, where, and why. The Navy has just such a system—the FUR (Failure and Unsatisfactory Report). Individual FUR reports are processed by the Naval Air Technical Services Facility at Philadelphia.

But problems and failures not reported, whether they be routine or emergency safety of flight, never get into the system. Thus data is not available when needed to make design recommendation, procurement, retrofits, changes, etc. On more than one occasion a decision to take no action has been based on what was believed to be an isolated case, no other similar breakdowns being reported. Later it turned out not to be an isolated case, and thus much valuable time was lost. The same applies to safety of flight reports. More than one accident has been caused because a problem had occurred and existed in other squadrons but was not reported. These experiences came only to light in determined probing *after a fatal accident* by higher authority!

Make no mistake. Naval Air Technical Services Facility is doing something with the data from your FUR, AmFUR, EFUR reports. They are publishing the BuWeps Material Reliability Digest (NavWeps 00-65-501) every two weeks and distributing its helpful intelligence to all ships, stations and units concerned with naval aircraft. This, together with Bureau action on this info, (see page 47 of this issue) and quarterly reports of accident data by NASC to manufacturers involved, and other activities of the BIMRAB program, provides the timely crossfeed and exchange of information so vital to getting the designers in tune with the users in the fleet. It is impossible to design sophisticated aircraft and components to work straight off the drawing board. Development is a necessary adjunct to good design.

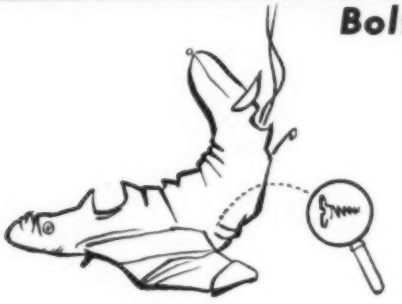
So the way to help yourself—and indeed the Navy—and reduce the maintenance error problem area is to include aggressive FUR and AMFUR reporting provisions in your local safety and accident prevention program.

How about it? ●

LIFT and DRAG

Maintenance Error—THAT'S ME!

Bolts

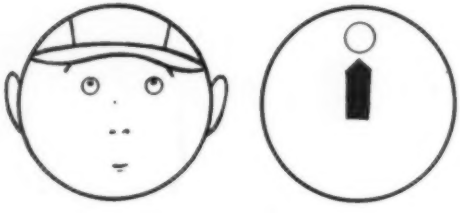


Who's the guy who knew what to do,
But installed the cover without a screw
That caused the accident when the part came free?
That's ME

Volts

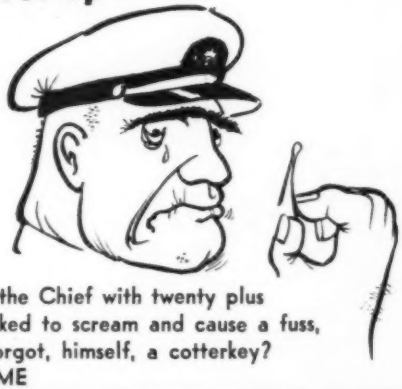
Who's the electrician who's not a fool,
And who's spent six years going to school,
Then hooked up the battery to 440 AC?
That's ME

Cover up



Who's the boot right out of training
That left the pitot uncovered when it was raining
So the airspeed read as wrong as it could be?
That's ME

Cotter up

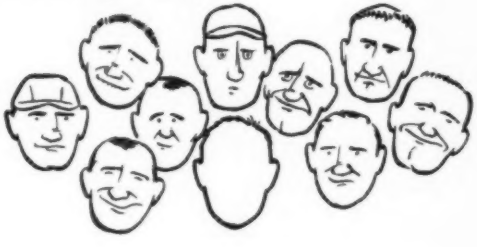


Who's the Chief with twenty plus
Who liked to scream and cause a fuss,
Then forgot, himself, a cotterkey?
That's ME

Cents didn't make sense

Who's the airframe mechanic with good intent
That replaced a washer with a bright new cent,
Then serviced oxygen to a T2V?
That's ME

Who's guilty?



Who's the man amongst Navy men
Who's responsible for one accident in every ten,
The one to whom Safety Officers address this plea?
That's ME.

E!